

BROOKLYN BOTANIC GARDEN

PLANTS
&
GARDENS



V48 #1 Spr 1992

THE

ENVIRONMENTAL GARDENER

BROOKLYN BOTANICAL
GARDEN RECORDS



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PLANTS & GARDENS

BROOKLYN BOTANIC GARDEN RECORD



THE
ENVIRONMENTAL
GARDENER

1992



Brooklyn Botanic Garden

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FRONT COVER: Sally Rasberry cuts flowers from a California garden
that is as lush as it is water thrifty. PHOTOGRAPH BY ROBERT KOURIK

BACK COVER: Pale purple coneflower, *Echinacea pallida*, one of scores of native wildflowers
that can be grown in a prairie garden. PHOTOGRAPH BY PATRICIA ARMSTRONG

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THE ENVIRONMENTAL GARDENER

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FOREWORD

Environmental gardening wasn't invented in the 1960s along with love beads and granola. As early as 1625, Francis Bacon declared that every garden should include "a heath or wilderness." It was one of the first recorded calls for more natural landscapes. The gardens of Bacon's day were formal spreads with knotted hedges and perfect symmetry. He described his new ideal, by contrast, as "nature imitated and tactfully adorned."

"Nature tactfully adorned" — statuesque trees on a sweep of green lawn — is as good a description as any of the typical American garden. This kind of manicured woodland was state-of-the-art natural gardening in the 17th century. But it's nature much too tactfully adorned for an age whose natural verdure is being stripped bare.

ABOVE: Purple prairie clover, *Dalea purpurea*, photographed in a prairie garden designed by Patricia Armstrong.

Our gardens have other environmental problems. Leaves, lawn clippings and other yard “wastes” account for nearly one-fifth of what ends up in overflowing landfills. More pesticide is used in home gardens than on agricultural lands. Home gardens suck up as much as 50 percent of domestic water.

So how do you create a garden that’s both beautifully designed and environmentally sound? In a nutshell, you work with nature, not against it.

One way to work with nature is to create a zone of natural landscape in your yard. While wildernesses around the world continue to shrink, impoverishing the biological diversity of the planet, garden acreage is growing. Home gardens have a potential as ecological sanctuaries that’s just beginning to be explored. In this handbook, pioneer natural landscapers explain how they create gardens that celebrate biological diversity and bioregional style — and how you can, too. Natural landscapers look to nature for broad patterns and a plant palette. They don’t just use a native plant or two but rather recreate entire native plant communities or significant parts of them — whether oak forest in New York, tropical hammock in Miami or California coastal chaparral. What their diverse gardens have in common is they’re designed to enhance surrounding native vegetation or, in areas where the local flora is long gone, restore what once flourished. And because they work with nature, not against it, they require much less coddling than their more cultured counterparts.

Does this mean that formal herb gardens and English-style herbaceous borders must be relegated to the dustbins of horticultural history? Not at all. That’s where xeriscaping, the new name for common-sense gardening, comes in. One of the basic principles of xeriscaping is that

you should select plants for your knot garden or perennial border which are suited to your climate — plants which won’t require massive infusions of precious water.

No matter what the style, an environmental garden also works with the natural cycle of decay and renewal. In nature, nutrients absorbed by plants are returned to the soil in the form of fallen leaves, wild animal manures and other natural “refuse.” It makes little sense to send leaves and lawn clippings to an overburdened landfill then scoot over to the garden center for peat moss and fertilizer when you can recycle yard “wastes” in your own backyard and nurture the natural processes of soil fertility.

By the same token, environmental pest control (so-called integrated pest management) begins with good garden design, selection of disease-resistant plants and an understanding of the interaction of pests and beneficial insects. Environmental gardeners work with the entire backyard ecosystem — not just the plants.

Despite its sometimes hisalutin terminology, environmental gardening is really simple common sense. Alas, terms like “xeriscaping” and “integrated pest management” are guaranteed to make even the most devoted gardener’s eyes glaze over; I’m convinced they’re a big reason why environmental gardening is not well understood or widely practiced. (Can you come up with catchier terms? Send your suggestions to me at BBG, 1000 Washington Ave., Brooklyn, NY 11225.)

In the pages that follow, gardening experts across the country cut through the jargon. Their articles are full of roll-up-your-sleeves practical advice on what you can do in your garden, day to day, to make a difference.

JANET MARINELLI
EDITOR



THE LAZY GARDENER'S GUIDE TO RECYCLING YARD WASTE

BY ROBERT KOURIK

Not long ago, composting was considered the quaint hobby of horticultural eccentrics who wore rumpled flannel shirts and preached the gospel of organic gardening. In those days, composting had an aura of sacredness. I should know — I started composting in the mid-1970s with a passion that bordered on religious fervor. Compost gurus like myself rapidly decomposed garden wastes in what was variously called an “aerobic,” “active,” or “hot” compost pile. These piles reached internal temperatures of 130 to 145 degrees F due to the activity of thermophilic (heat-loving) and aerobic (air-loving) bacteria. They required careful attention to the proper balance between woody (carbonaceous) and high-nitrogen materials (manures and leafy greens) — a 30-40:1 ratio to be exact — as well as the amount of moisture and air throughout the pile. More importantly, thermophilic compost piles require frequent turning — once

a week or more — to “feed” the bacteria their dose of oxygen. None of this stopped me. Like many organic gardeners of that era, I made prodigious amounts of compost. Of course, I was underemployed and had plenty of time on my hands.

My near-religious fervor about composting has mellowed into a more even-handed approach toward this important part of the garden's cycle of decay and renewal. Today, instead of composting every kitchen scrap and every pruning, I separate them into different categories and treat each with the technology or technique that requires the least amount of effort.

Active composting a la 1970s is fast becoming a gardening relic. And here's the ultimate heresy: Some yard wastes need not be composted at all. There are more convenient ways to avoid throwing them away and still improve your yard. The idea is to choose the mix of options that's best for your lifestyle and budget.

ROBERT KOURIK is the author of *Designing and Maintaining Your Edible Landscape Naturally*.

Mulching Mowers

For many gardeners, raking, bagging and composting the never-ending stream of

lawn clippings is an occasion for some choice curses. But why bother? A “new” product, the mulching mower, allows you to skip the hassle not only of composting but also raking and bagging lawn clippings. The mulching mower was actually introduced some 30 years ago, but consumers weren’t ready for it. A mulching mower has a specially designed blade and blade housing which finely chop the lawn clippings. In a mulching mower, the discharge chute which spews out the clippings is blocked off and they’re blown back down into the turf where they decompose and help fertilize the lawn. Recent studies have shown that regular mowing when the grass is one to one-and-a-half inches taller than the cutting height may provide all the fertility your lawn requires. Not only that, but mulching mowers also save time — according to one study, seven hours over a six month period compared to regular mowing and bagging.

Some mulching mowers, called convertible mowers, enable you to capture clippings and leaves for composting when you want them. With convertible mowers you can have it either way, bagging clippings for composting or fertilizing your lawn.

All leading manufacturers of lawn mowers now offer one or more versions of a mulching mower. Some sell conversion kits for existing lawn mowers. The most important criterion for selecting a mulching mower is the engine’s horsepower rating. These mowers need at least a four- or five-horsepower engine to move the blade quickly enough to achieve cutting, shredding *and* mulching.

Go to a local dealer. Take different models for a test mow. Be on the lookout for clogging, bunches of clippings on top of the grass and a ragged cut. The best cut is usually made by mowers with a doughnut-shaped blade housing. Other things to consider: How convenient is it to change the blade? How easy is it to attach and release the collection bag? Is the bag hung

behind the mower instead of to the side, so it’s easy to mow the edges of the lawn?

For a mulching mower, you’ll spend from \$200 to \$500; convertible mulching mowers cost \$250 to over \$600.

Leaf Shredders

In the fall, deciduous trees produce a flurry of compostable material throughout much of the country. Leaves make a decent mulch or wonderful rich leaf mold when fully decomposed. But the blizzard of leaves in fall can overwhelm the most dedicated gardener.

One option is to use a dedicated leaf shredder to make the volume of leaves more manageable for mulching or composting. They’re designed specifically to shred leaves and non-woody vegetable waste — not woody material, which should be shredded by a chipper.

There are several basic types of leaf shredders: leaf blowers which can be reversed to suck and shred the leaves and gasoline or electrically powered leaf shredders with either a filament or metal blade — called dedicated leaf shredders. Most manufacturers claim their leaf shredders can reduce ten bags of leaves to one bag of finely chopped material, for a 10:1 ratio. But studies indicate the true ratio of reduction is between 8:1 and 4:1 — still helpful.

Gas-powered shredders often require frequent cleaning of the air filter. On the other hand, electric shredders need an extension cord which can be a cumbersome bother in the landscape. Electric shredders tend to be slower than gasoline-powered models, although some slice and dice leaves as fast as the gas versions. Shredding thirty gallons of leaves can range from as fast as thirty to forty seconds to as long as four minutes. Always ask for a demonstration of the model you’re considering to test the amount of reduction and speed. At the same time, note how much shredded material blows back out of the hopper and how much noise the shredder makes. Get



GARDENER'S SUPPLY

Combination chipper-shredders can turn a variety of garden wastes into valuable mulch.



GARDENER'S SUPPLY

Chippers are designed for woody wastes, which take forever to break down in a compost heap.

names from your local dealer or people who have purchased the model you're thinking about buying. And be sure to find out how well it works with wet leaves.

Other features to consider: Is the machine designed to protect your eyes and hands? Is a safe and useful tamper for pushing leaves into the mouth of the hopper included? Do you get protective goggles? How big is the mouth of the hopper? For a leaf shredder, expect to spend from \$100 to \$275.

You can avoid the expense of a shredder by heaping leaves in a huge wire-mesh cylinder in some hidden corner of your yard for one or two years. In some cities, leaves are picked up for free and composted; you can buy back the finished compost and avoid all the hassle of making your own. Plus, the leaves stay out of the landfill.

Chippers

Woody trimmings, which take forever to break down in a compost heap, can be chipped to cover a path or to use as a mulch. Most machines both chip and shred. The chipping is usually done in a side chute where branches and limbs are inserted into a rotating disk with fixed blades which shear off chips like carrots in a food processor. Shredding is done by carefully inserting the yard waste into a hopper on top of the machine where swinging or fixed hammers shred the material. The hammer-type machines usually have a sturdy screen covering the discharge port and all the material must be shredded to the same size as the screen before exiting. Because of the screen, this type of shredder is more likely to clog and stall than a knife-blade chipper. However, unlike knife-blade chippers, you can change the size of the discharge screen and therefore the size of the chips.

Buying a good quality chipper is no small investment — expect to pay at least \$500, and up to \$1300. A cheaper alternative is a very slow compost pile, more like a



Wooden compost bins are neat but unnecessary.



The easiest way to compost is with a free-standing pile.

crude heap, which will rot the woody waste if left alone long enough. Another consideration is whether you generate enough prunings to justify buying a chipper versus occasionally renting one. Remember, chippers are no fun to use — they rattle and shake, make a racket and are about the most dangerous garden tool.

The three most important considerations when buying a shredder or chipper are the engine's power, the sturdiness of the housing and the quality of the wheels.

Chippers come with either electric or gasoline engines. The latter are up to six times faster than the best electrical versions. However, electric models are quieter and vibrate less. If you opt for a gasoline-powered shredder, select a name-brand engine with the highest horsepower you can afford.

Make sure the housing is built with heavy-gauge metal, looks and feels sturdy and is well constructed. For example, avoid self-tapping screws in favor of nuts and bolts with lock washers. If the model has one, make sure the discharge screen covering the chipping mechanism is easy to change. Be sure it is easy to change the oil on the gas-powered models.

When testing a chipper at your local



A large cylinder or square made from wire or snow fencing is an easy way to keep your compost pile under control.

dealer, check to see if any material is thrown back out of the hopper, how well protected your hands are from the cutting mechanisms, how easy it is to get the last of the branches through the hoppers and how safe it is to use the tamper to push material through.

Other considerations: Will the machine chip the size and type of branches found in your yard? The typical chipper ad proclaims "Takes branches up to three inches thick!" But these ads seldom use the word "hardwood." And some studies found that the chipper could only handle the largest diameter mentioned in its literature if the branches were straight. Take samples of the wood you'll be chipping to the dealer and do a test run. Before buying, be sure to quiz others about their experiences. If possible, rent the machine you're thinking of buying and put it through its paces.

Chipper/shredders sell for \$300 to as much as \$1300. Many quality models in the \$500 to \$600 price range are available.

Composting Made Easy

After you've considered the above gizmos to determine the least time-consuming ways to manage your yard waste, it's time to consider the easiest way to compost what's left. Again, choose the least complicated options for your yard and lifestyle.

Binless Composting

With all the composting boxes, bins and cages on the market you'd think the Eleventh Commandment was "Thou shalt not compost without a store-bought gadget." Yet the easiest way to compost is with a free-standing pile. Just about any pile of organic matter will eventually rot if left to its own devices. But if you're just tossing stuff in a big "passive" compost heap, you'll need a large area for the heap's wide bottom. And, as with any kind of passive composting, what you get is not as rich as carefully layered and painstakingly turned hot compost, though it certainly will improve your soil's texture.

Bins from Pallets

Resourceful gardeners discovered long ago that wooden shipping pallets make cheap and effective compost bins. The gaps between the wooden slats help aerate the compost. Pallets are reused many times for shipping. When they're too battered to be useful any longer, they're often available for free — but always ask the shopkeeper first. Many gardeners simply lash each pallet to the next and leave the last one loosely attached to act as a door. Other gardeners install vertical posts in all four corners of the bin to support the pallets. A pallet can also be used on the bottom of a bin to help circulate air up through the bottom of the pile.

Compost Cylinders

Large cylinders made from ranch or snow fencing are easy ways to contain large passive compost piles. In fact, any type of flexible fencing, preferably with mesh or spaces to help aerate the pile, will do. Keep the height four feet or less to make it easy to toss the raw materials inside the cylinder. Put a wooden or metal fence post every two to three feet around the perimeter to support the wire. Leave one end of the fencing loosely tied to a post so this flap can be opened to remove the finished compost.

Cylinders, free-standing piles and pallet bins should be covered with a tarp to prevent the pile from getting soaked when it rains.

Designer Composters

If your taste leans toward a more expensive or ready-made composter, you have plenty of choices. Each one, of course, is advertised as the best solution to everybody's composting needs. The following discussion will help you sort out the hype.

The minimum volume for active composting is about one cubic yard (cy) (27 cubic feet (cf) or slightly more than 22 bushels) — depending on various factors. For example, active composting at the end of November in Michigan may necessitate

three, four or five cubic yards of material to insulate enough of the pile from the cold weather to promote thermophilic activity. Passive compost piles, which don't have to heat up, can be smaller.

Many of the models listed below have no provision for protection from rain. You'll need to use a tarp, a wooden or metal lid or plastic sheeting to cover the composter for the best results.

Simple wire containers. Tidier than a free-form heap, quicker than building your own bin and able to contain a fair amount of compost, simple wire bins are perfect for the beginning composter. They're portable, economical, widely available from mail order companies and easy to assemble. You'll find many shapes for sale — square, hexagonal, round and pentagonal. The sizes range from 15.5 to 23.7 cf.

All wire bins use galvanized metal mesh made from seven- to 14-gauge wire, and some have the added protection of a PVC coating. But some wire bins bend or bow out too easily. Each product is made from a different type of wire mesh; some are fairly sturdy, others are rather flimsy. The smaller the gauge number on the wire, the greater its strength. Consider how easy it is to open up the bin, to unload finished compost and to put the bin back together.

Individual wire bins cost from \$30 to \$50. Some models have extra panels for \$19 to \$32 which allow you to expand the capacity.

Wooden bin kits. Wooden compost bins come in two basic styles: with sides made of solid boards or of long, thin slats which are stacked horizontally like a log cabin. For an active compost pile, purchase only a model which allows you to take all the boards out from one side, starting from the top down.

Wooden bins have some serious limitations. First, they are vulnerable to gradual decay because the composting bacteria also eat away the wooden bin itself. Models made from rot-resistant woods like red-

wood or cedar are the only ones that will last. You can further slow decay by painting the wood with linseed oil or one of the new low-toxicity preservatives on the market, such as the one made by AFM. Don't use toxic wood preservatives which contain arsenic, creosote or pentachlorophenol, which can leach into your compost and contaminate your garden.

Second, wood warps and twists easily, especially the log-cabin style bin with long narrow slats. Once these warp, it is very difficult to re-insert the metal rods in the corners.

Most wooden bin kits hold from 20 to 29 cf. Prices for a wooden-slat model range from a low of about \$79 to nearly \$125. Solid-sided bins cost between \$100 and \$200.

Plastic compost bins. Plastic would seem to be the ultimate faux pas in an environmental garden. But compost bins made from plastic have some important advantages over wooden ones. Plastic bins don't rot, last a long time, don't warp from moisture and are lightweight and easy to move. Some are made from 50 to 100 percent post-consumer recycled plastic. Just make sure the plastic has an ultraviolet inhibitor to protect it from sunlight.

Most models have a sliding panel near the bottom for harvesting finished compost. Check this access panel to be sure there's enough slack for easy opening and closing. Several plastic composters come with three separate sections which can be re-stacked in reverse order when turning the pile.

Some mail order catalogs tout their plastic composters with "insulating walls." These are either one-quarter inch plastic walls, double walls or corrugated walls. The advertising copy claims such panels "promote heat retention for faster composting — even in cold weather" while, a little further down, maintaining that "the ventilation system ensures rapid decomposition." Get real guys! You can't have *both* excellent heat retention *and* air circulation, especially in cold weather.



GARDENER'S SUPPLY

Plastic bins don't rot or warp. Some are even made of recycled material.



GARDENER'S SUPPLY

The top of this kitchen waste digester flips up so you can add food scraps for earthworms and bacteria to digest.



GARDENER'S SUPPLY

Rotating composters are supposed to make turning easier. Some do, some don't.

One new plastic bin on the market is made of a plastic mesh cylinder with solid plastic interchangeable tops and bottoms, called dishes. Because the lips of the dishes fit snugly around the cylinder and the mesh has holes only three-eighths of an inch square, these bins are rat resistant. They're also very easy to use. The parts can be leapfrogged when turning the pile. To turn the pile inside the mesh cylinder you simply take the top dish off, set it nearby with the lip up, undo the carriage bolts on the front of the mesh cylinder, reassemble the mesh cylinder on what used to be the top dish, fill the cylinder with the partially composted material and cover with the remaining dish — which used to be the bottom dish. These models are made from 100 percent recycled plastic, come in 12 or 21 cf versions and cost from \$50 to \$130.

Tumbling composters. Rotating composters spin around their long axis and compost tumblers rotate top-to-bottom from



Red worms, which can be cultured in a small box indoors or outside, turn kitchen scraps into a rich natural fertilizer.

The author's advice: Learn to love—or at least like—worms.

the midpoint of their long axis. Rotating or tumbling composters have the benefits, according to the catalogs, of "compost in just 21 days without the back strain of hand turning." But wet or moist compost is *much* heavier than it looks. To compensate for this weight, rotating bins often have a limited capacity (from seven to 11 cf). Still, some people have difficulty rotating the drum. Tumbling composters usually require squatting to either turn or harvest the compost. Some large rotating models hold up to 22 cf and have a geared drive to make the turning easier, but some people still have trouble cranking them.

Some rotating drums have lots of holes for aeration. Such composters tend to dry out the compost too quickly. And they require more attention to the proper carbon-to-nitrogen ratio.

Make sure the model you're thinking about buying is convenient to fill and

empty. Some drums don't empty directly into a wheelbarrow or garden cart. Others are high enough to dump into a wheelbarrow, but the hatch is too high off the ground for easy loading.

Tumbling or rotating compost drums cost from \$100 to nearly \$400.

What to Do With Kitchen Wastes

Kitchen scraps make a rich compost, but they're about the most awkward compostables to deal with. They can attract insects and rodents. If improperly disposed of, they can also smell. Most kitchen scraps can be added to hot compost piles. If you've got a passive compost heap — or no compost pile at all — the simplest way to deal with kitchen wastes is to bury them in trenches or holes throughout the garden with a cover of at least eight inches of soil. But this doesn't help much in small yards or where winter temperatures freeze the ground solid.

Kitchen Waste Digesters

These are among the newer inventions. They're usually cone-shaped with dark green or black sides to help heat up the scraps to promote dehydration, which decreases the bulk, and bacterial digestion. Some have a plastic basket which is buried in the ground just below the cone to help fend off raccoons, mice and rats.

Kitchen waste digesters have a few limitations: If conditions are right, bacteria and earthworms digest the wastes; if not, you get a small, slimy pile of wastes which have been decomposed anaerobically. In either case, you bury what's left when the digester is full and must be moved. The digesters are not usually free of fruit flies as the manufacturers claim. Rats sometimes chew through the plastic basket to eat the waste. The digesters shouldn't be used where a high water table would flood the soil beneath the cone. In a large household, the device can fill up within four or five months. And when you move the cone to bury the rotted material, the smell can be intense if the wastes have gone anaerobic.

Worm Bins

Red worms (*Lumbricus rubellus*) have prac-

tically insatiable appetites for kitchen scraps and produce nutrient-rich worm castings. And worms can be cultured in fairly small boxes inside the house, in the basement, root cellar, garage or even the kitchen year-round.

Over the years, worms have become my preferred method of converting kitchen scraps into valuable fertilizer. I know, I know — some people need years of therapy to get beyond their aversion to slimy, snake-like things. My advice is to learn to love, or at least like, worms! They're one of nature's grand cultivators and decomposers. They're quite tame creatures with fascinating habits. Best of all, they produce a concentrated, highly desirable fertilizer — not just a soil amendment like a passive compost pile or the various compost-in-a-black-plastic-bag techniques recommended for city gardeners.

To start, you need a two-pound coffee can's worth of worms. (Most gardening magazines have classified sections with listings of mail order worms.) Worm bins should be kept in a cool area where temperatures stay between 55 and 75 degrees F. Properly managed worm bins are odor free. 🌱

S U P P L I E R S

The following companies can supply you with some or all of the equipment you need to recycle yard waste in your own garden:

GARDENER'S SUPPLY

128 Intervale Rd.
Burlington, VT 05401
(802) 660-3500

KINSMAN CO.

River Road
Point Pleasant, PA 18950
(215) 297-5613

MTD PRODUCTS

P.O. Box 36900
Cleveland, OH 44136

R.C. WIGGLE WORMS

Box 898, 6 RD 3399
Flora Vista, NM 87415
(505) 334-9691

RINGER CORPORATION

9959 Valley View Rd.
Eden Prairie, MN 55344
1 (800) 654-1047

SUNCAST CORPORATION

701 North Kirk Rd.
Batavia, IL 60510
(708) 879-2050

THE FLIP SIDE OF COMPOST

WHAT'S IN IT, WHERE TO USE IT AND WHY

BY RICHARD M. KASHMANIAN

AND JOSEPH M. KEYSER

Gardeners like to think of themselves as nurturing types — hands in the soil, coaxing riches from the earth. We tend to forget that our gardens are linked ever so closely to the local landfill. Every time we rake leaves or lawn clippings, deadhead or prune, bag it up and leave it on the curb, we're contributing to that enormous environmental problem known as "municipal solid waste." In fact, according to the U.S. Environmental Protection Agency (EPA), yard trimmings account for almost one-fifth of what ends up in landfills — about 31 million tons a year. Combined with kitchen food scraps, they represent about 28 percent.

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JOSEPH M. KEYSER is Director of Programs of the American Horticultural Society, and the designer of its National Home Composting Park in Alexandria, Virginia.

Fortunately, there's an easy way not only to keep this stuff out of overburdened landfills but at the same time make our gardens healthier, lusher and more productive — by using compost. Off-the-shelf composters, leaf shredders, mulching mowers and a host of other new garden equipment is making it ever easier to recycle yard trimmings and kitchen scraps in our own backyards. But beyond that, by buying compost at the garden center and using it as a soil amendment, mulch and natural source of nutrients, gardeners can help boost the fledgling compost industry and thus encourage environmentally sound uses of other organic residues as well, from livestock manures to fish byproducts to municipal sewage sludge.

The Garbage Problem

Americans throw away about 180 million tons of municipal solid waste each year. EPA estimates that in 1988, 73 percent of this ended up in landfills, 14 percent was incinerated and 13 percent was recycled. Only one percent was made into compost. If

soiled paper were added to the yard trimmings and kitchen scraps, up to 30 to 60 percent of all discards could potentially be composted in specially designed facilities; this paper probably wouldn't be recycled back into paper products.

Why does so much compostable material get shipped off to landfills and incinerators, with their environmental problems, when it can be used to enrich our gardens? That's a question increasingly asked by the government officials who must deal with the garbage glut. Some states have taken ambitious steps to encourage composting. Fifteen have already established bans on some or all kinds of yard trimmings from landfills. Eight of these bans were in effect as of January 1, 1992: Connecticut (leaves), Florida (leaves, grass, woody materials), Illinois (leaves, grass, prunings), Iowa (leaves, grass, wood chips), Minnesota (leaves, grass, prunings), Missouri (leaves, grass, Christmas trees), New Jersey (leaves) and Pennsylvania (leaves, prunings). The bans in the seven other states — Arkansas, Massachusetts, Michigan, North Carolina, Ohio, South Carolina and Wisconsin — will go into effect by mid-1995. More than 40 percent of the American population lives in these states. In many states, local governments are collecting the yard trimmings from homeowners and setting up large-scale facilities where they are turned into compost. In other states, private companies are also building and running composting operations.

If nobody uses all this compost, these efforts will collapse. And that's how gardeners can help. "Residential users" — that is, gardeners — are one of the largest markets for compost in the country.

The Benefits of Compost

Compost, a relatively stable humus product, is an excellent soil conditioner or amendment. It's rich in organic matter. It also contains a modest amount of the "big three"

RICHARD KASHANIAN



To ease the pressure on overburdened landfills, local governments and private companies are getting into the composting business. Above and at right are typical composting facilities. By using compost, gardeners can encourage environmentally sound uses of discarded leaves, lawn clippings and other organic "wastes."

nutrients — nitrogen, phosphorus and potassium — although the exact nutrient level depends on the materials composted and how they are composted (see Table 1). Compost provides additional macronutrients, such as calcium, magnesium and sulfur, and micronutrients like copper, iron, manganese and zinc, which generally are not available in chemical fertilizers. It is typically dark brown to black in color, crumbly



ROBERT KOURIK



Before: the raw materials.

ROBERT KOURIK



Plastic bags and other debris are removed.

ROBERT KOURIK



After: brown gold for the garden.

and earthy smelling. You can make it in your own backyard, pick it up for free at some municipal composting facilities or buy it from private and agricultural composting operations, in addition to garden centers and other retail outlets.

Using compost improves the soil's biological, chemical and physical properties, ultimately improving the soil's fertility. It's especially beneficial when incorporated in clay and sandy soils. Adding compost to clay soils reduces soil density and compaction

T A B L E 1
APPROXIMATE NUTRIENT AND pH VALUES
FOR DIFFERENT TYPES OF COMPOST

COMPOST TYPE	NITROGEN (% DRY WT)	PHOSPHORUS (% DRY WT)	POTASSIUM (% DRY WT)	TOTAL PH
Yard trimmings	0.1 % 2.0 %	0.03% 1.0 %	0.04% 3.8 %	5.7- 7.6
Livestock manure	0.5 % 3.0 %	0.1 % 4.0 %	0.5 % 3.0 %	8.0- 9.0
Municipal sewage sludge	1.0 % 1.5 %	0.4 % 2.0 %	0.2 % 0.4 %	7.2- 8.0
Fish byproducts	0.6%- 5.1%	0.1%-2.0%	0.6%	8.0

and improves soil porosity, aeration and drainage. Water and plant roots can penetrate more deeply. The upper soil layer is less saturated, so there's less danger of root rot.

Adding compost to sandy soils binds together soil particles, improving their ability to retain moisture and nutrients, withstand drought and resist erosion. Plant growth is improved because more water is available for root uptake and soluble nutrients don't leach quickly through the soil. Leaching nutrients can pollute the groundwater. Less leaching also means you won't have to use as much fertilizer, or as often.

Adding compost also increases the soil's cation exchange capacity (CEC), and thus its natural fertility. When the soil's CEC is improved, it is better able to attract and hold positively charged nutrients, including calcium, magnesium, nitrogen and potassium. These plant nutrients are therefore less likely to leach into the groundwater.

Compost typically has a pH of 7.0 to 8.0 (see Table 1). Slightly alkaline compost reduces the need to add lime in some gar-

den situations. However, if you're using it on soils where acid-loving plants are grown (that is, plants which prefer a soil pH of less than 6), be sure to apply it with an acid-rich mulch like coffee grounds, pine bark, sawdust, shredded oak leaves or wood ash.

Compost has other advantages. Organic materials and nutrients are returned to the soil. Soil tilth and structure are improved. There is less crusting, making it easier for seedlings to emerge. The soil is easier to work, and soil temperatures are moderated. Increasing the soil's organic content creates a favorable environment for earthworms and increases the soil microbial activity that fosters plant growth. Some composts can even suppress plant diseases. This in turn reduces the need for chemical pesticides and the potential pollution that results when water washes them into waterways or groundwater supplies. And properly processed compost is largely free of pathogens and weed seeds.

Last, but still very important, is the fact that compost releases nitrogen slowly

T A B L E 2
HOW MUCH COMPOST TO APPLY

PLANT/SOIL APPLICATION	COMPOST APPLICATION RATE
New lawns	1"-2" mixed into top 4"-6" of soil
Reseeded lawns	1" mixed into top 2"-3" of soil
Topdressing for existing lawns	1/8"-1/4" spread uniformly
Topdressing for vegetables, flowers, shrubs	1"-2" spread uniformly; if spread 3"-4" deep, check for sowbugs
Ground cover and annual planting beds	3" mixed into top 6" of soil
Garden soil	1"-3" mixed into top 6"-8" of soil
Incorporation around shrubs	3" mixed into top 6" of soil
Potting mix	25%-30% by volume
Mulch for deciduous trees, rose beds	3"-4" spread uniformly
Mulch for vegetables, annual and perennial planting beds	2"-3" spread uniformly
Mulch for exposed slopes	2"-4" of coarse compost (3/4"-1 1/2") spread uniformly

NOTE: The application rates in this table represent ranges reported in the published literature on compost. Approximately 1,000 pounds of compost is equivalent to one cubic yard of compost. One inch of compost spread over one acre is equivalent to approximately 65 tons of compost at a 40% moisture content. Where appropriate, these rates represent annual applications.

because almost all of the nutrients are in organic forms. The organic nitrogen must be converted to inorganic ammonium and oxidized to nitrate to become available to plants. On average, approximately 10 percent (and as high as 20 percent) of the nitrogen is released during the first year, 5 percent the second year and 2 percent each year thereafter. (About 25 to 40 percent of the phos-

phorus and 70 percent of the potassium are available during the first year.) These estimates vary according to soil aeration, moisture and temperature. This slow release of nitrogen is often better synchronized with the nutrient needs of the growing plant.

Quick-release chemical fertilizers are more apt than composts to create an oversupply of nitrogen in the soil which can lead

to leaching of nitrates and groundwater pollution. The excess nitrates can also pollute water runoff and end up in rivers, lakes and streams. However, even when you use compost you should grow winter cover plants (alfalfa, clovers, rye, vetch) to absorb nitrates that may otherwise wash away once the growing season is over.

Composted organic materials are usually preferable to uncomposted organic materials as a source of organic matter. The compost is relatively stable humus, whereas soil organisms must decompose the uncomposted organic material before its nutrients are released. If you add uncomposted material rich in carbon (such as leaves and sawdust) to your soil, you may need to add nitrogen because as the soil microbes decompose it they tie up nitrogen that would otherwise be available to the growing plants. Uncomposted (or not fully composted) materials are best incorporated during the fall to allow enough time for the soil to season them before spring planting.

Using Compost in the Garden

You can use compost in a variety of ways — as a soil conditioner or amendment throughout the garden, as a lawn topdressing, in potting soils, as a germination or rooting medium and as a mulch. It can replace peat moss, which has to be taken from somewhere else and therefore impoverishes another ecosystem to improve your garden. Compost also can replace or reduce the need for potting mixes, chemical fertilizers, lime and other soil amendments, chemical pesticides and inorganic mulches.

A compost's particle size helps determine its use. For example, a fine compost (less than seven-sixteenths of an inch) should be used as a topdressing (if incorporated into the top one to two inches of topsoil it is unlikely to wash away in a rainstorm), in

a potting mix or as a soil amendment. A coarse compost (seven-sixteenths of an inch or greater) is best used as a mulch.

Seasoned compost can comprise up to 25 to 30 percent by volume of a potting mix. Higher levels can cause waterlogging and poor aeration and necessitate amendments like perlite to improve drainage.

When used as a topdressing for lawns, compost increases the earthworm population and encourages deep root growth.

Mulch helps the soil retain moisture by reducing evaporation. It minimizes soil spattering from rainfall and therefore the spread of soil-borne diseases. It reduces compaction and soil erosion (even on steep slopes), suppresses weeds (especially if applied after weeding) and moderates soil temperature. Mulch improves the environment for earthworms and thus helps aerate the soil. It also returns organic matter to the soil as it breaks down.

How Much Compost?

How much compost you should apply (see Table 2) depends on the fertility of your soil, the specific use of the compost, the type of compost, the needs of your plants and the time of year. If the compost is bagged, follow the directions on the label. Give the soil about a month to fully condition the compost before you plant.

When applied as a mulch, compost should be spread within one to two inches from the base of the plant to beyond the plant's drip line. Heavily mulch plants with shallow roots (for example, rhododendrons and azaleas) for the winter months to protect them from freezing and soil upheaval. Some of the mulch should be removed in early spring so the soil can warm up and encourage early season root growth and development.

The views expressed in this article are the opinions of the authors, not the official policy of the U.S. Environmental Protection Agency.



XERISCAPING DEMYSTIFIED

This water-conserving California garden includes a lush assortment of native plants and non-natives from similar climates around the world.

A WATER MISER'S GUIDE TO GARDENING

BY BOB HYLAND

Xeriscaping is the unfortunate term for gardening that uses water sparingly. In fact, more than one wit has called it "zeroscaping" — conjuring up images of gardens with nothing but gravel and cacti. Yet xeriscapes need not

be dull, dusty landscapes consisting of sparse plantings in a sea of pebbles. No matter where you live, you can have a water-thrifty garden with a lush diversity of native and exotic plants from similar climates across the country and around the world.

BOB HYLAND is *Director of Education for Strybing Arboretum and Botanical Gardens in Golden Gate Park, San Francisco. He also sells water-wise perennials and shrubs at Magic Gardens Nursery in Berkeley.*

Like the term xeriscaping, the principles of low-water landscaping evolved in the Desert Southwest. Drought, heat and water restrictions have taught gardeners in Arizona, New Mexico and other arid states to grow drought-tolerant plants, install low-vol-

ume irrigation systems and design gardens zoned according to water needs.

Here in Northern California, specifically the San Francisco Bay Area, gardeners have endured five years of winter drought. In San Francisco's Mediterranean climate we can normally expect 22 to 24 inches of rainfall between November 1 and April 30, followed by six months of dryness. Most plants have to be irrigated during the summer dry period. The current drought has severely depleted reservoirs and groundwater supplies and ended our ability to water gardens and lawns indiscriminately — forever! Yet xeriscaping is still not that well understood or widely practiced.

Gardeners in regions with more abundant water supplies and more reliable, evenly spaced rainfall have been even slower to embrace xeriscaping. But periodic spells of summer drought, short-term water restrictions and difficult-to-forecast climate changes have hit almost every section of the country in recent years. Xeriscaping makes good environmental sense for gardeners everywhere.

Xeriscaping has six, easy-to-understand concepts:

- ◆ Use common-sense design by grouping plants with similar water requirements.
- ◆ Limit turf areas.
- ◆ Grow water-efficient plants suited to your climate.
- ◆ Irrigate efficiently and conservatively.
- ◆ Improve the water-holding capacity of your soils.
- ◆ Use water-conserving mulches.

Common-Sense Design

At Strybing Arboretum and Botanical Gardens in Golden Gate Park, San Francisco, we demonstrate many xeriscaping techniques to the public. We group plants according to their geographic origins and water requirements. Plants from the various Mediterranean climates — around the Mediterranean Sea,

Cape Province of South Africa, southwestern Australia and California — are grown together in landscaped collections. Generally, plants from these regions have adapted to summer drought conditions.

You can adapt this principle for your home garden. Group plants not only by similar needs of sun, shade, soil type and pH (acidity or alkalinity) but by water needs as well. Look carefully at your garden and you'll discover it has several microclimates caused by different conditions of sun and shade, ground slope, available moisture and air movement. Map these areas and use them to divide your yard into low, moderate and high water-use zones. Any lawn area will be a zone of high water use, which is why limiting the amount of turf grass is so important. Even here at the Botanical Gardens, turf areas are used sparingly and limited in size; large, mulched planting beds predominate.

Select plants for the moderate water-use zone based on how much irrigation they will require when they're mature. Irrigation is needed weekly during the establishment of new plantings from containers, but once settled in (generally after one year), the plants in this zone should require less frequent watering. Locate the moderate water zone close to the house to take advantage of runoff from downspouts, driveways, patios and decks, and of graywater collected from the shower or laundry to provide additional water.

The low water-use zone is reserved for plants which, once established, require little if any water other than that provided by normal rainfall (and in coastal California by fog). In San Francisco's Botanical Gardens many slopes and boundary areas are planted with evergreen, shrubby, native California chaparral species like manzanitas (*Arctostaphylos* spp.), California lilacs (*Ceanothus* spp.) and fremontia (*Fremontodendron californicum*), which require little or no summer irrigation.

Limit Turf Areas

The general recommendation for the average single family lot in California is 800 square feet or less of irrigated lawn. Of course, yards in San Francisco (and cities across the country) are much smaller and require considerably less lawn. Inner city gardeners should seriously consider doing without grass — it's thirsty stuff and requires weekly mowing and other maintenance to keep it attractive.

Design your lawn as an oasis of green on fairly level ground to prevent water runoff and locate it close to decks or patios for high visual impact. Here in Northern California we recommend coarse, deep-rooted, tall fescue grass mixes that are better able to pull moisture from the soil and stay green with less frequent irrigation. In the Botanical Gardens, we also encourage the planting of ground covers as alternatives to turf grasses, such as woolly thyme (*Thymus pseudolanuginosus*), blue star creeper (*Laurentia fluiatililis*), stonecrops (*Sedum* spp.), prostrate myoporum (*Myoporum parvifolium*) and creeping rosemary (*Rosmarinus officinalis* 'Prostratus'). Many of these have soft textures like the turf grasses and can tolerate light foot traffic.

Grow Water-Efficient Plants

"Water-efficient," "drought tolerant," "water-wise" and "water-thrifty" are all apt descriptions of the type of plants you should consider for your garden. A wide range of beautiful plants including trees, shrubs, flowering perennials, ground covers and bunchgrasses fit the description — not just cacti and succulents!

Choose plants that are adapted to cope with reduced irrigation. Silver or gray foliage that reflects sunlight, cools the plant and reduces water loss is one such adaptation. Plants that develop deep root systems, especially a single taproot, are also capable of surviving with less watering.

In private California gardens we have visited on tours sponsored by Strybing Arboretum & Botanical Gardens, I've seen shrubs such as California lilac (*Ceanothus* 'Julia Phelps'), purple hop bush (*Dodonaea viscosa* 'Purpurea') and pineapple guava (*Feijoa sellowiana*) look remarkably attractive with little to no summer watering. In fact, some members of the *Ceanothus* genus are so sensitive to summer water that one or two irrigations will kill them outright.

Likewise, perennials such as *Penstemon* 'Midnite' and *P.* 'Huntington Pink', Russian sage (*Perovskia atriplicifolia*), dwarf lavenders (*Lavandula angustifolia* 'Hidcote') hybrid lavender (*Lavandula* 'Quasti'), lamb's ear (*Stachys byzantina* 'Silver Carpet'), red-hot poker (*Kniphofia uvaria*) and green lavender-cotton (*Santolina virens*) bloom their heads off and/or display showy foliage with infrequent irrigation.

Wherever you live and garden you should be able to find plant lists based on low-water requirements. The plants may be a bit different from those in the pages of most English and East Coast-biased gardening books, so you may need to open your eyes to a new aesthetic. Check with local water agencies, horticultural libraries at public gardens, Cooperative Extension offices, state departments of water resources or state and national xeriscape councils for suggestions. Better yet, visit demonstration xeriscapes at botanical gardens, parks and water district offices.

Irrigate Efficiently

Here at the Botanical Gardens we teach four steps to efficient irrigation. We realize that it's difficult to change over to a low-volume watering system in an established landscape. When you're replacing areas of a garden, consider retrofitting the irrigation system to apply the correct amount of water.

◆ Separate irrigation lines into the high, moderate and low water-use zones that

you've delineated in your garden plan and set an automatic valve at the head of each line. High use lines should be equipped with spray heads; moderate use lines should use bubbler and shrub spray heads. Low water-use lines should have drip emitters that supply water at a slow rate, reducing runoff and allowing for deep watering. Soaker hoses that are less expensive and easier to install are an alternative type of drip system. Drip irrigation applies water only where needed — at the base of the plant, which encourages good root growth.

◆ For turf grass (or lawn substitute) areas, overlap sprinkler spray patterns so that water from one head reaches out to the next nearest head. Ask your irrigation supplier for sprinkler heads that have "matched precipitation rates" and which put out "low gallonage."

◆ Tie each valve into an automatic timer to control how many minutes each applies water. Select a timer that allows recycling — several cycles of on/off "run time" during each irrigation day.

◆ Prepare and follow an irrigation schedule. Water your garden during the cool times of the day to reduce evaporation. Ask your local water utility for tips.

Improve Your Soil

Here in the San Francisco Bay Area we have a variety of soil types with varying water needs. Parts of the city have clay soils that absorb water slowly and cause surface runoff; other neighborhoods nearer the ocean and bay have sandy soils that dry rapidly and leach nutrients away quickly from plant roots.

My advice to gardeners is to learn about the composition of your soils. You can purchase a soil test kit and do your own analysis or you can usually send soil samples to testing laboratories or your county Cooperative Extension office. These tests will answer questions about soil structure, pH, micronutrients and general fertility.

There are many organic amendments that can be applied to improve your soil. Home composting is one of the most ecological ways for gardeners to have a ready source of organic matter for soil improvement. At the Botanical Gardens soil amendments such as fir and redwood mulches,

Scaevola 'Mauve Clusters', left, is a handsome, drought-tolerant substitute for thirsty lawn in a California garden. Below, drip irrigation emitters apply water where it's needed—on new plantings.



BOB HYLAND

BOB HYLAND



To save water, limit the size of your lawn
and use large mulched planting beds instead.

peat, wood shavings and compost are all used in different plant collections, depending on the needs of those plants. Our redwood grove is a self-sustaining ecosystem that continually freshens its own soil through the buildup and decomposition of needles shed by the mighty coastal redwoods (*Sequoia sempervirens*).

At the Botanical Gardens most of our grass clippings, weeds, chipped tree prunings and other organic waste is hauled to a central composting site located in Golden Gate Park. Finished compost is then readily available to our gardeners when needed. Another San Francisco gardening organization that offers composting demonstrations and a wealth of literature is San Francisco League of Urban Gardeners (S.L.U.G.). Many cities have similar community-based gardening groups who can provide advice on composting.

Use Mulches

Mulched planting beds are an ideal replace-

ment for water-guzzling lawns. Mulches cover and cool the soil and minimize evaporation of soil moisture. When applied to a depth of two to three inches, mulches eliminate weed growth and help slow erosion. As they decompose and are turned into the soil, they improve soil tilth and fertility.

There are many organic mulches to choose from. Compost makes a great mulch. The most commonly used mulches are bark chips in a variety of sizes and shredded tree mulches, typically redwood and fir here in Northern California. Other mulches include cocoa hulls and wood shavings.

The bottom line is that xeriscaping uses water wisely and conservatively in any type of climate, be it here in California or New York. We all need to conscientiously practice its water-saving principles. Whether you're starting a garden from scratch at the drawing board or gradually retrofitting an established "water-dependent" landscape, I encourage you to think "less water" before you plant.

AN ENVIRONMENTAL GARDENER'S GUIDE TO PEST MANAGEMENT

BY CRAIG HOLLINGSWORTH

AND KAREN IDOINE

Since the first seeds were gathered and deliberately planted, pests have been the bane of gardeners. Over time, we have created many of our own pest problems. By concentrating crops at one site, we've made food more accessible for pests. As a result, they reproduce more quickly. Whenever we till the soil, we create a hospitable environment for weed seeds to germinate and grow. We've imported pests from around the globe — without the natural enemies that keep them in check. More commonly, we've made pest problems worse by using pesticides indiscriminately. In fact, on a per acre basis, more pesticide is applied to home gardens than to farms in the United States.

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We know that pesticides can cause environmental problems. What isn't so obvious is that they also cause horticultural problems. Killing the natural enemies of a pest may lead to later, more severe outbreaks of the same pest. Pesticides can also kill the natural enemies of other organisms, causing outbreaks of still more pests. Repeated pesticide use often makes the pests become resistant to the pesticides, so that ever higher doses are required. Problems — largely from pesticide use — have led to a new concept of managing pests called "integrated pest management" or IPM.

Ecological Pest Management

Integrated pest management is an ecologically based approach to pest control. Fields, gardens or lawns aren't automatically treated with weekly or routine sprays "just in case." Even the discovery of a pest doesn't automatically trigger a control action; instead, the plants are checked regularly to make sure the pests aren't present in numbers large enough to do

significant damage. IPM is a decision-making process. Using an IPM approach you decide what causes the problem, if you need to do something, what you need to do and when to do it.

Properly practiced, IPM includes a combination of sensible pest controls and preventive measures that minimize adverse effects to the environment while protecting the plant. IPM is an opportunity to practice backyard ecology, to understand the interaction of all living organisms in a garden environment — not just the plants.

How to Start

To start your IPM program, you need a plan. What is your objective: to have a healthy, safe, bountiful garden? To produce perfect, undamaged plants for flower shows? To nurture a variety of plant and animal species for your enjoyment? To minimize your use of pesticides? To use no pesticides at all? Your objectives will help determine which mix of management techniques is best for you. Often, you'll have several conflicting objectives and you'll need to compromise. Once you've set your priorities, there are a few basic procedures to follow:

- ◆ Learn about the pests and problems associated with each crop or planting in your area. Don't wait until pests appear, as many problems can be avoided simply with proper plant selection and garden design. Different pests require different methods of control, depending on their life cycle, habits and physiology.

- ◆ Monitor your plants or crop at regular intervals to see how many pests are present and what kind of damage is being done.

- ◆ Establish a threshold for damage. In agricultural IPM programs, farmers use precisely defined "economic thresholds" to determine when to treat pest populations. These are based on the value of the crop,

the damage caused and the cost of treatment. Gardeners can use a similar process for determining when and what treatment is required. Is the damage tolerable? Is it serious enough to warrant action? The action itself will depend on the degree of damage or potential damage. A few Japanese beetles may warrant hand-picking, while greater numbers might justify treating the beetle grubs in the lawn while they are small and vulnerable.

- ◆ Combine management strategies that complement each other. For instance, resistant plants, proper site selection, biological controls and physical barriers all reduce pest damage, but when combined, or integrated, provide even greater protection. Keep in mind that a garden is a refuge for many living organisms. Most of them aren't pests, but rather useful inhabitants which enhance the garden by decomposing dead plants, pollinating, preying on pests or providing food or shelter for other useful organisms. Select management practices least harmful to all of the organisms in your garden.

- ◆ Keep notes on what you see — the level of damage, the action you take, what works and what doesn't. They will prove immensely helpful in the future.

Choosing Strategies that Work

The tools of IPM include cultural practices, biological controls, physical controls, traps and chemical controls. The best courses of action will vary according to local conditions and your own objectives.

Cultural Practices

Cultural practices are growing techniques which make the garden less favorable to pests, thereby reducing the need for more expensive and disruptive controls. Practices will vary with the type of garden or planting. Some cultural controls are:



TINA SMITH

Don't just reach for the dust or spray. Handpicking, applications of *B.t.* and row covers are less toxic caterpillar controls.

This yellow pan trap will let you know when the first aphids of the season arrive.



TINA SMITH



TINA SMITH

Put predators to work in your garden. Here, a stinkbug nymph attacks a Colorado potato beetle.

◆ **PEST-RESISTANT SPECIES AND CULTIVARS.** Look for plants without pest problems and cultivars bred specifically for pest resistance. For example, shade gardeners in the Northeast can reduce insect problems by planting witch-hazel, bayberry and other insect-resistant shrubs¹. Apple growers can significantly reduce fungicide use by selecting disease-resistant cultivars.

◆ **LIGHT AND AIR CIRCULATION.** Choosing a site with good air circulation can reduce the need for fungicide on susceptible plants. Pruning and wide plant spacing promote air penetration and movement, further reducing disease problems. Trees

¹ See "Insect Resistant Shrubs" by R.J. Gouger in *Gardening in the Shade*, Brooklyn Botanic Garden Record, Handbook #61.

Keep weeds
down—and conserve
water—with mulch.

CRAIG HOLLINGSWORTH



CRAIG HOLLINGSWORTH



Row covers
moderate temperature
and keep out pests.

TINA SMITH



Proper site selection can
be critical. Because the
tree on the left is in
shade part of the day, it
is less susceptible to
white pine weevil
attack.

around gardens or lawns can be thinned or pruned to allow more light to penetrate. On the other hand, dense plantings keep the weed population down. Apparent conflicts of this type are common in IPM, but they can be resolved by weighing the potential benefits and consequences of both actions.

◆ **SANITATION.** Removing dead or infected plant parts from the garden reduces the

spread of potential diseases and other pests.

◆ **CULTIVATION.** In most garden situations, herbicides are not necessary; weeds can be controlled simply by hand cultivation. The secret is timing — one well timed cultivation won't take any more time than spraying an herbicide but can save hours of struggle with overgrown weeds. Usually, the best time to cultivate is when weeds are small and succulent, before seeds have set. Spend

some time choosing a comfortable, easy-to-use hand cultivator.

Biological Controls

When you introduce a pest's natural enemies into your garden or try to get them to come naturally by creating a hospitable environment, you're using a biological control. Natural enemies can be predators, parasites or diseases. You can increase populations of natural enemies by providing them with shelter and additional food sources — nectar-producing plants, dill, coriander, caraway and other plants in the parsley family, for example. Minimizing pesticide use also helps.

Some natural enemies, such as nematodes, ladybird beetles and Trichogramma parasitic wasps, are available for purchase. It's important to select the right natural enemy for the specific pest and to release it under the right conditions. For example, nematodes require moist organic soils. If you purchase ladybird beetles that have just come out of hibernation, they may require a flight period before settling down to feed; and when they do settle down, it may be in someone else's yard.

Some natural enemies are general feeders while others are more specific. Ladybird beetles feed on many soft-bodied insects, while Trichogramma wasps generally attack the eggs of moths and butterflies. Preying mantids are such general feeders

that they will attack almost any insect — including pollinators and natural enemies.

The use of diseases to control insect pests is becoming increasingly effective. The bacterium *Bacillus thuringiensis*, or *B.t.*, is marketed under several trade names, including Dipel and Biobit. *B.t.* attacks specific insect groups, depending on the variety selected. *B.t.* products are available for control of caterpillars, Colorado potato beetle, elm leaf beetle, fungus gnats and biting flies. Be sure to purchase the right strain for the pest you're trying to control. Because *B.t.* is so specific in its action it is very safe for humans and does not interfere with other management practices.

Physical Controls and Traps

Physical controls include hand picking, mulches, barriers and even vacuum systems that suck up pests.

◆ **MULCHES.** In addition to conserving water, mulches are an excellent nontoxic weed control. In the home garden, plastic or fabric mulches eventually lead to disposal problems. Organic mulches which break down in the soil, contribute to the build-up of humus and provide shelter for predators (especially spiders) are probably a better choice. Because mulches may also provide a moist habitat for slugs, clean cultivation may be the best option where slugs are a problem.

S U P P L I E R S

PEST MANAGEMENT SUPPLY, INC.

P.O. Box 938
Amherst MA 01003

IPM LABORATORIES, INC.
Locke NY 13092-0099

GREAT LAKES IPM
10220 Church Rd., NE
Vestaburg MI 48891

NECESSARY TRADING CO.
One Nature's Way
New Castle VA 24127-0305

GARDENS ALIVE!
P.O. Box 149,
Sunman IN 47041

◆ **ROW COVERS.** Another multi-purpose horticultural tool, spun-bonded polypropylene fabric row covers are used primarily as frost protection, growth enhancers and season extenders. Used during pest activity periods, they can also prevent pests from infesting small fruit and vegetable crops.

◆ **TRAPS.** You can use traps to monitor pests or to reduce pest populations. They work by using visual, odor and sexual cues to attract insect pests.

Visual traps mimic the light waves of a host plant, but the color is more intense than the real thing. Thus, a yellow trap, a mimic of green foliage, is more attractive to the insect than the foliage itself. A common visual trap in the Northeast is the red sphere. The sphere attracts apple maggot flies by mimicking a red apple. During the period when apple maggot flies are in flight, the trap is larger and redder than the apples and therefore more attractive. Home gardeners can eliminate sprays against apple maggot by placing five red spheres in each apple tree. Other visual traps include white and blue cards, which attract different pests in different situations (for example, tarnished plant bugs are attracted to white cards, greenhouse thrips to blue cards).

Another common trap in the Northeast is the Japanese beetle trap, which is baited with sexual and floral attractants to lure beetles away from flowers and other plantings. Because these traps attract more beetles into an area, make sure you place them far enough away and downwind from plantings to avoid making the beetle infestation even worse. Generally these traps are useless in neighborhoods with large resident beetle populations. In a country setting, where the beetle population is less widespread, traps placed well away from the crop to be protected may be of some value.

You can buy traps for slugs or make them yourself using shallow pans or jar lids

FOR MORE INFORMATION

IPM programs often depend on specific information. Some of this information can be obtained through your local Cooperative Extension office.

The following books are good references:

Common Sense Pest Control: Least Toxic Solutions for Your Home, Garden, Pets and Community by William Olkowski, Sheila Daar and Helga Olkowski. 1991, Box 5506, Taunton Press, Newtown, CT 06470-5506.

Pests of the Garden and Small Farm: A Grower's Guide to Using Less Pesticide by Mary Louise Flint. 1990, University of California Publications, 6701 San Pablo Ave., Oakland, CA 94608-1239.

sunk to ground level and baited with beer. A "roof" made from a cottage cheese container can reduce evaporation and keep rain from diluting the beer.

Chemical Controls

For some pests, there is no adequate cultural, physical or biological control; pesticides are the remaining option.

Pesticides should be selected and applied in a way that causes the least environmental disruption and the least impact on beneficial and other non-target species. Again, combining other management techniques with the use of a pesticide will be more effective than relying on the chemical alone.

Be careful when you use any kind of pesticide. Even "organic" or naturally occurring pesticides are toxic (see the article that follows). Insecticidal and herbicidal



Attract beneficial insects
by adding fennel and
other plants of the
parsley family to your garden.



Japanese beetle traps should be placed well
away from your garden.



soaps are relatively non-toxic to humans, but they can affect a wide range of species, including beneficial insects. Whenever possible, they should be applied directly to the pest, as a spot treatment. When using soaps, look for phytotoxic reactions. Tissues of some plants react adversely to soaps, causing spotting, browning, or even plant death.

A pesticide is more effective if the application is timed to treat the most sensitive stage of the pest. Knowledge of the pest and its life cycle is therefore important.

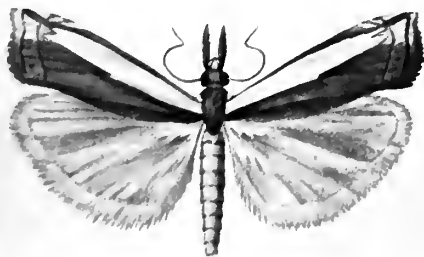
For example, non-toxic horticultural oils can smother mite eggs while more toxic pesticides are ineffective against eggs. These oils are highly refined, and under conditions of moderate temperature and low humidity, can be applied to most ornamental and some vegetable crops, even in summer.

Pesticides are usually formulated specifically for specific pests on specific plants. Before using a pesticide READ THE LABEL and make sure that it's the right pesticide for the situation.

NATURAL PESTICIDES

ARE THEY REALLY SAFER?

BY CHERYL BEST



Sod Webworm Moth

Public concern over the safety of pesticides has prompted more and more companies to develop natural pest controls, including natural chemical pesticides derived from plants. Because safety appears to be the chief reason behind the growing market for natural pesticides, it's logical to ask just how safe are they?

To answer this question, it's necessary to define the word "safe." One aspect of safety concerns a pesticide's potential impact on the environment. Does it pollute groundwater supplies? Does it contaminate the soil? Will

it injure or kill fish, birds, mammals or beneficial insects? How long does it persist in the environment? The other aspect of safety

concerns human health. How toxic is the pesticide for each route of potential overexposure — dermal (the pesticide falls on your skin and scalp while you're applying it), inhala-

tion (you breathe in the spray or dust) or oral (you accidentally ingest the pesticide). In short, the question about natural pesticides isn't are they safer, but rather in which ways and for whom?

Debunking the Ads

The next step in assessing safety is debunking the popular belief that organic and natural are synonymous with safe and wholesome. All carbon compounds, including lab-synthesized pesticides, are classified as "organic." "Natural" pesticides, on the other hand, include only those products extracted from natural sources like plants. This is still no guarantee of safety. Many of the most poisonous chemicals known occur naturally.



Japanese Beetle

CHERYL BEST was an urban horticulture specialist with Cornell Cooperative Extension for eleven years and is now Director of Education at the Central Park Conservancy.



Cutworm

Natural chemical pesticides, like synthetic chemical pesticides, can be potent poisons. Most natural pesticides do less ecological damage than synthetics because they break down rapidly when exposed to heat, light and water. This means they don't persist in the environment and are therefore unlikely to contaminate water and soil. "Residual effectiveness" is the specialist's term for a pesticide's ability to persist in its active toxic form for a relatively long time. Even the petrochemical-derived pesticides in wide use today generally have less residual effectiveness than now-banned pesticides like DDT which accumulated in the tissues of ospreys, eagles and other birds of prey and caused reproductive failure. However, residual effectiveness varies from pesticide to pesticide. The synthetic pesticide chlorpyrifos, which kills lawn and house pests, persists up to a year in soil, while glyphosate, an herbicide, is quickly inactivated in soil. Rotenone, a botanical pesticide used primarily on vegetable crops, breaks down quickly on plants and in soil and lasts up to a month in water, while ryania and pyrethrum last a relatively long time for botanicals.

Because natural pesticides have relatively low residual effectiveness, this might lead you to conclude that they are safe. But residual effectiveness is only one measure of safety. All pesticides are also rated according to their levels of acute toxicity: highly toxic, moderately toxic, slightly toxic and relatively nontoxic. This is represented by a value called an LD50 (meaning Lethal Dose: 50%). It is the single dose (in mg per kg of body weight) which when administered to laboratory test animals killed 50 percent of the population. LD50s are determined for oral exposure as well as inhalation and absorption through the skin. Because the numbers represent single doses, they cannot be used to determine chronic toxicity or non-lethal health effects. However, they are a valuable measure of

the relative toxicity of chemicals. Pesticides containing chemicals with very high LD50s (5000mg/kg and above) are relatively nontoxic, whereas those containing chemicals with oral LD50s in the double digits (0 to 50mg/kg) can be highly toxic, depending on the formulation.

Natural pesticides can be derived from many sources. Five pesticides in common use today are botanicals, derived from plants. In order of lowest to highest LD50, these are: nicotine, rotenone, ryania, pyrethrum and sabadilla. The chart at right compares the LD50s of these botanicals with some popular synthetics.

Although all five botanicals break down relatively rapidly into harmless compounds once released in the environment, a few have other safety problems:

Nicotine, which is extracted from tobacco plants, is a violent poison that injures the human nervous system. It's also toxic to other mammals, as well as to birds and fish. Nicotine is particularly dangerous because it is a contact poison, meaning it is easily absorbed through the skin and does not have to be eaten to have toxic effects. A slightly less toxic formulation, nicotine sulfate, was once widely available, but its use is now restricted in many states. Pure nicotine is federally restricted and illegal for home gardeners nationwide. Nicotine sulfate, sold under the brand name Black Leaf 40, kills a broad range of sucking insects and larvae, including aphids and leaf miners. It also kills beneficial insects. If it's legal in your state and you decide to use it, wear protective clothing and apply with extreme caution.

Rotenone is extracted from the roots of many plants and is available as a 1 or 5 percent dust or wettable powder, or as a liquid formulated with other botanicals such as pyrethrum or ryania. The more compounds included, the broader its ability to kill and the higher its toxicity. Rotenone alone is approved by the U.S. Environmental Protection Agency (EPA) for

TOXICITY OF PESTICIDES NATURAL AND SYNTHETIC

PESTICIDE	BOTANICAL/SYNTHETIC	ORAL LD50*	DERMAL LD50*
Rotenone	Botanical	50-75	>940
Nicotine Sulfate	Botanical	83	285
Propoxur	Synthetic	95-104	>1000
Chlorpyrifos	Synthetic	97-276	500-2,000
Diazinon	Synthetic	300-400	455-900
2,4-D	Synthetic	375-800	800-1,500
Carbaryl	Synthetic	500-850	>4,000
Ryania	Botanical	750-1,200	>4,000
Malathion	Synthetic	1,000-1,375	>4,444
Pyrethrum	Botanical	1,500	>1,880
Glyphosate	Synthetic	4,300	>7,940
Methoxychlor	Synthetic	5,000	>6,000
Sabadilla	Botanical	5,000	Little reaction
Benomyl	Synthetic	9,590	Little reaction

* An LD50 (Lethal Dose: 50%) is the single dose in mg per kg of body weight which, when administered to laboratory animals, killed 50% of them. LD50s are determined for oral exposure and absorption through the skin. Pesticides with very high LD50s (5,000 mg/kg and above) are relatively non-toxic. Pesticides containing chemicals with oral LD50s in the double digits (0 to 50 mg/kg) can be highly toxic, depending on the formulation.



Sod Webworm

use on a variety of edible and ornamental plants. It kills many insects, including Mexican bean beetles and flea beetles. It is most commonly available by its own name, but also by the trade names Prentox and Noxfish. The most powerful of the widely available botanicals, rotenone is moderately toxic to humans and many animals, and highly toxic to fish and other aquatic life. Therefore it should never be used near a waterway. Rotenone is both a stomach and a contact poison that slows the breathing and heart rates of many organisms, including mammals. Since rotenone is most commonly available as a dust, overexposure is most apt to occur through inhalation. Wear a protective mask while applying it.

Ryania is made by grinding up the stems of a South American shrub, *Ryania speciosa*. It doesn't kill insects outright but makes them too sick to eat the treated crop. Ryania is the most selective botanical pesticide, killing only a few pest species, including the European corn borer and coddling moth. Combination formulations like Triple Plus (Natur-Gro) kill a broader range of pests. Like rotenone, ryania is a contact and stomach poison available as a dust, but it is less toxic to mammals. However, it breaks down more slowly, so it persists in the environment longer.



Gypsy Moth Larva

On crops, ryania should be applied long enough in advance of harvest to ensure that no residue remains on the food. This interval varies from crop to crop, but overall safe intervals are listed on the product label.

Pyrethrum contains active ingredients called pyrethrins, which are extracted from the seeds of a species of chrysanthemum. It controls dozens of fruit and vegetable pests by paralyzing them on contact. Insects must be sprayed directly for the chemical to work,

and will revive completely if they don't receive the lethal dose. For this reason, pyrethrum is often combined with rotenone in formulations such as Red Arrow Insect

Spray. Some formulations contain the synthetic

Grasshopper

chemical synergist piperonyl butoxide for increased potency. Pyrethrum products are relatively non-toxic to humans but slightly toxic to fish and other aquatic life. Like rotenone, pyrethrum should not be used near waterways. Pyrethrins should not be confused with pyrethroids, synthetic compounds which break down more slowly in the environment and are more toxic to wildlife and honeybees.

Sabadilla comes from the seeds of a South American lily. These seeds contain toxic substances which rapidly decompose when exposed to light. Sabadilla is used to control lice, leafhoppers, squash bugs, striped cucumber beetles and chinch bugs. It's primarily a contact poison with low toxicity to wildlife. Usually formulated as a dust



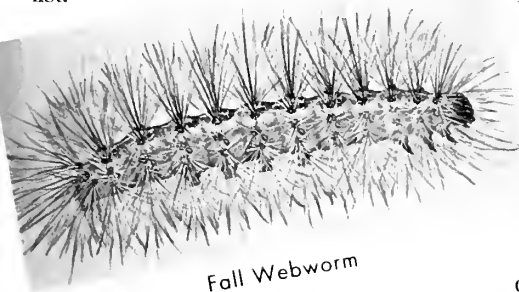
Gypsy Moth

or wettable powder, Sabadilla is marketed by its own name and as Red Devil Dust. It is irritating to mucous membranes, so use a mask during application to protect your nose and throat. Sabadilla does have some residual effectiveness on plant surfaces, particularly when used in partial shade, but it breaks down more rapidly than ryania. Some studies indicate that it is toxic to bees; like other bee toxins, it should be applied during evening hours when honeybees generally are less active.

Whether you're using botanical or synthetic pesticides, clothing — long sleeves, pants, closed shoes and particularly hats (pesticides are most readily absorbed through the scalp) are a must. This clothing should be laundered separately, and after each use.

Rating Cancer Risks

When you think about the health effects of exposure to chemical pesticides, cancer is probably at the top of your list.



Fall Webworm

Unfortunately, there is no simple test that can determine definitively whether a pesticide does or doesn't cause cancer in humans.

Pesticides are rated for carcinogenicity (the capacity to cause cancer) by the EPA. The agency's ratings are based on years of long-term animal studies done by pesticide manufacturers themselves. Once the test

data is submitted to the EPA, it is reviewed by a committee of scientists who

then vote on the product's carcinogenicity rating. This is a complex task, because data on animals must be extrapolated to determine cancer risk to humans over a long period of exposure. The committee members do not always agree unanimously on the rating of a particular chemical. The final decision is by majority vote.

Rotenone, a botanical, is one pesticide on whose carcinogenicity rating committee members could not reach a consensus. Feeding studies did produce tumors in rats, but the majority ruled that rotenone is unlikely to cause cancer in humans.

Gardeners should also be aware of the fact that the EPA has not evaluated the carcinogenicity of many widely used pesticides. Only rotenone and two of the other pesticides listed on the accompanying chart have been evaluated for potential cancer risk — propoxur and benomyl, which are rated as probable and possible carcinogens, respectively. This is just one more reason why home gardeners should use pesticides — natural or synthetic — judiciously if at all.



Tent Caterpillar




Chinch Bug



White Grub

This article is adapted from an article that appeared in Garbage magazine.



DESIGNING WITH NATURE IN NORTHERN NEW ENGLAND

BY PATRICK CHASSÉ

Nature is the ultimate garden master. Nature was the first owner of our gardens, and still exerts great influence over them. Recognizing this is the key to designing stable garden environments that require a minimum of maintenance. "Design with nature," as Ian McHarg put it in his 1969 book for planners, is also good advice for gardeners.

Nature is the main source of cues for the woodland gardens I design in northern New England. The East Asian tradition of emulating nature's forms and textures in a garden is a great inspiration. When the Chinese or Japanese talk about mountains and outcrops as the "bones of the earth," they are very much aware that, naked or green, it is these rocky "bones" which give the land its basic structure. Gardeners in the Far East study the most important elements of the natural landscape — the shape

and arrangement of landforms, the location and animation of water, the type and texture of stone, the patterns of vegetation, the relative scale of various elements — then distill them in a garden design. The smaller garden becomes a sort of visual echo of the larger natural setting and each complements the other.

Landforms

Designing a garden without regard for topography is like designing a stuffed toy without the filling. When designing gardens, the first thing I do is study the natural bones of the site and the surrounding countryside. I look at landforms: rounded or jagged? High or low? Soft or hard? Bold or subtle in texture? Then I think about how to recreate them on a smaller scale — what elements must be included to capture the essence of this landscape?

Here on the rockbound Maine coast, our bedrock underpinnings are very evident. The glaciated granite forms the foundation on which our forests, fields and wetlands grow, and it also determines the types and depths of soils that support these ecosystems. It provides not only the physical struc-

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ture but also the aesthetic structure that gives them their visual character.

The character and placement of stone is of utmost importance in the natural garden. Whether I'm building or repairing a natural landscape, I try to replicate the natural pattern of stones. In some parts of New England that means mimicking rock outcrops. In other areas it means recreating a seemingly random distribution of weathered glacial boulders. If a garden in a stony area is devoid of stone, it will look out of place.

Soil

When the bones of a natural garden are in place, then the flesh should be added. Soil, which softens the topography and provides the medium for plant growth, should be chosen and placed with care. Again, it's critical to study the local soil — its pH, its texture, its nutrient content. All of these factors have helped determine which plant communities grow most comfortably in the area.

The success or failure of any natural garden is tied to how accurately the plants and the soils are matched. Soil pH is the factor most often overlooked. On the Maine coast, for example, the indigenous soils, derived mostly from granite and related rock types, are quite acidic. The high percentage of naturally occurring ericaceous plants in this area, such as lowbush blueberry, sheep laurel and mountain cranberry, need acid soil for best growth. By contrast, many monocots, including grasses, prefer a "sweeter" or more alkaline soil, which is why lawns in this area must be limed regularly. Using neutral or alkaline soils in a garden of local acid-loving woodland plants will work against you in two ways: The native plants will be less likely to thrive, and you'll be encouraging other species — especially grasses — which are highly aggressive weeds in the woodland plant community.

The idea is to have nature working with you rather than against you. If your soil and plantings don't match, you'll be forever weeding and nursing along your struggling native planting.

Light

The amount of light on site is another important consideration. I've often been called to a property whose owners longed for a lush native planting for a dense, light-starved patch of forest floor. This is particularly a problem when the tree canopy is primarily evergreen — as in Maine's spruce-fir forests. But it's also a problem in many older suburban gardens where evergreens such as hemlock or white pine, planted for privacy or to screen objectionable views, have matured into a dense tree canopy. The lack of light in these situations severely limits the choice of desirable plants.

If privacy is not the overriding consideration, a tree stand can be thinned to let in more light. But keep in mind that if you're trying to establish a native woodland planting, it's possible to introduce too much light, making conditions unfavorable for some desirable species — some ferns or mosses, for example. Within each of these plant groups normally considered shade tolerant there are species which can't tolerate strong light. For example, while hay-scented fern and haircap moss can thrive in full sun, male fern and cushion moss prefer low light. Too much light can also tip the balance in favor of the weeds. Again, grasses are often the invading villains when you're trying to establish a rich woodland ground flora and you introduce too much light.

Thinning branches from the top and sides of the tree canopy is a more subtle way to increase light than removing whole trees. It's much easier to remove a few more branches later than to try to replace a tree too hastily removed. To mask any hint of human intervention, thin and groom the



Blueberry ledges ablaze in autumn. Nature tends to plant in bold drifts.
So should natural landscapers.

overstory and the understory with studied irregularity. In too many woodland gardens the edge between groomed and untouched forest is as obvious as the edge between tall grass and a freshly mowed strip.

Plant Associations

Plants, of course, are a primary concern in gardening, wild or otherwise. There are two approaches to the planting composition of a

natural garden: reproducing the natural associations of a native plant community, the mix and massing of species, using only native plants, or imitating the look of a natural plant community, using a variety of plants both exotic and native. The latter has been the inspiration for many gardens here and abroad — particularly for the classic English rhododendron garden with its exotic shrub and ground cover collections planted as nat-



"Native sod" rescued from a blueberry farm, including white-flowered bunchberry dogwood.



It's difficult to tell which rock outcrops are natural and which are not.



In this garden the author exposed the natural rock ledge and used matching stone to create a patio.

NATIVE PLANTS FOR NORTHEAST WOODLAND GARDENS

<i>Acer pensylvanicum</i>	Moose maple
<i>Amelanchier canadensis</i>	Shadbush
<i>Amelanchier laevis</i>	Shadbush
<i>Aralia hispida</i>	Bristly sarsaparilla
<i>Aralia nudicaulis</i>	Wild sarsaparilla
<i>Arctostaphylos uva-ursi</i>	Bearberry
<i>Asarum canadense</i>	Wild ginger
<i>Aster macrophyllus</i>	Bigleaf aster
<i>Clintonia borealis</i>	Bluebead lily
<i>Comptonia peregrina</i>	Sweet fern
<i>Cornus canadensis</i>	Bunchberry dogwood
<i>Dennstaedtia punctilobula</i>	Hay-scented fern
<i>Dryopteris filix-mas</i>	Male fern
<i>Thelypteris noveboracensis</i>	New York fern
<i>Gaultheria procumbens</i>	Wintergreen
<i>Gaylussacia baccata</i>	Huckleberry
<i>Ilex verticillata</i>	Winterberry
<i>Kalmia angustifolia</i>	Sheep laurel
<i>Maianthemum canadense</i>	Wild lily-of-the-valley
<i>Myrica pensylvanica</i>	Bayberry
<i>Osmunda cinnamomea</i>	Cinnamon fern
<i>Polypodium virginianum</i>	Rock fern
<i>Polystichum acrostichoides</i>	Christmas fern
<i>Polytrichum commune</i>	Haircap moss
<i>Rosa virginiana</i>	Virginia rose
<i>Thalictrum polygamum</i>	Meadow rue
<i>Trientalis borealis</i>	Starflower
<i>Vaccinium angustifolium</i>	Lowbush blueberry
<i>Vaccinium corymbosum</i>	Highbush blueberry
<i>Vaccinium vitis-idaea</i>	Mountain cranberry
<i>Viburnum alnifolium</i>	Hobblebush
<i>Viburnum cassinoides</i>	Wild raisin
<i>Viburnum dentatum</i>	Arrowwood
<i>Viola</i> spp.	Violets

uralized woodland understories.

Natural landscaping based on native plant communities is more of an American idea, closely allied with our appreciation of wilderness. But this type of ecologically naturalistic garden is far more difficult to plant because many native species are not yet available in the nursery trade and collecting them from the wild can endanger sparse populations. The difficulty of finding the plants you want becomes an important design consideration. I usually tailor the design of my wild gardens to the list of what is readily available.

Many of the native North American plants propagated for sale in nurseries are woody plants, and many have been on ornamental plant lists since the 17th and 18th centuries. Long-time nursery favorites like mountain laurel and paper birch were introduced from North America into European gardens before the American Revolution. These American plant celebrities are still popular, but their cousins sheep laurel and yellow birch still aren't widely appreciated or sold. Other plants — trilliums, for example — are available at nurseries but too frequently are dug from the wild and then potted up for sale, threatening native populations. Often, plants that grow in bold masses in the wild are the most common native plants in an area, and the hardest. Fortunately, these plants also tend to have great visual impact — both in nature and when massed in the garden. When these species are available at nurseries, it's a safe bet that they can be used in the natural garden without endangering plant populations.

In addition to nursery stock we use plants from three "wild" sources: from elsewhere on the garden site, from "rescue" sites (that is, construction or agricultural sites where the plants are earmarked for destruction) and from private property — with permission, of course. Rescue sites are my favorite. Our richest rescue source is

the thousands of acres of blueberry fields in eastern Maine. Lowbush blueberries are marketed as "wild blueberries" but the fields are actually groomed, burned and treated with chemical sprays. Because some of the most pernicious weeds are ericaceous like the blueberries themselves, herbicides which might control them are toxic to the blueberries. Patches of these woody weeds are tolerated until they're so large that it makes sense to plow them up and replace them with crop stock. It just happens that among these "weeds" are bunchberry dogwood, wintergreen, haircap moss and hay-scented fern — all beautiful plants for natural woodland gardens in northern New England. Our biggest windfall in the last few years came from a large field about to be cleared to make a playing field at a local private school. We cut the plants with a sod cutter and moved them out before the bulldozers moved in. Development in natural areas is a controversial issue. But when destruction is inevitable, it's satisfying to be able to save at least some of the native flora.

Once you've chosen a plant community and located the plants, design of a natural garden is similar to that of conventional ornamental plantings. Now the aesthetics of the arrangement is your primary concern — massing, scale, color, texture, seasonal change. Unless you have an eye for the rare and tend to find inconspicuous plants the most interesting, you're probably most attracted to the more dramatic beauty of masses of plants in nature. Nature tends to paint in bold strokes. Unless I'm deliberately using a plant as an accent, I never plant in groups of fewer than three, and often plant by the dozens. I arrange each mass in relation to its neighbors, usually in incremental steps from ground cover up through understory, shrub and tree layers. I also plant for changing color and texture through the seasons. Brilliant red blueberry

and huckleberry and yellow moosewood foliage become a highlight in autumn after a season as a green backdrop, while fruits and twigs of bayberry and winterberry liven up the winter months.

Edges

Connecting the planting to the surrounding landscape is an element of wild garden design that can't be stressed enough. Plant communities in nature blend in characteristic ways. A common plant association in New England is a meadow edged by shrubs which blend into the understory of a forest.

There are few clear-cut edges, unless there is also an underlying radical change in soils or moisture conditions. When planting out into a natural setting, or creating an entire plant community, gardeners too often end the planting as they would a herbaceous border — with a nice tidy line. Instead, try making the density of the planting more open as you move to the perimeter with a few small "islands" of plants floating out into the mostly unplanted ground. The same goes for clearing the forest understory: Where the weed wacker or pruning saw stopped shouldn't be obvious to the eye.

Planting

One thing to keep in mind when you get down to the actual planting of a woodland garden is that the plants will often be sparse — usually because you have used young plant stock — and it's important to discourage weeds by mulching thoroughly. Look at the model plant community for clues about what to use as mulch. If oak leaves, for example, or pine needles are the naturally occurring mulch, use them in your garden. (When was the last time you saw bark chips the size of barbecue briquettes covering the forest floor?) Another thing to keep in mind is the pH of the mulch and its effect on the soil.

Don't fertilize when you plant! The soils that support many wild plant communities are relatively low in fertility. A big shot of nitrogen might benefit the weeds more than the desired plants. You can always add nutrients later, when there is clear evidence that something is in short supply.

Maintenance

Here are a few rules of thumb for maintenance of newly established native woodland gardens:

◆ During the first full season, water whenever soil moisture falls below ideal levels for the new plants. If your plants have been properly matched, they should have similar moisture requirements. When the planting is well established it should require no additional watering, except during severe drought.

◆ Weed frequently. The bigger the weeds, the more they will disturb the soil when pulled. If you don't weed diligently the first year, you may lose control of the planting and not be able to wrest it back from the intruders. Indeed, the first three years are critical.

◆ Keep bare soil between plants well mulched to discourage weeds and conserve moisture. Check and loosen mulch regularly to allow rhizomatous and stoloniferous plants to spread. Don't use plastic sheeting. One way to keep costs down is by using a heavy "working mulch" (such as shredded bark) with an attractive "dress mulch" (such as pine needles) on top.

◆ Don't be concerned if there isn't much leaf growth at first. Even if vegetative growth is slow during the first season, the roots may be actively establishing themselves.

◆ Check the soil pH after the first winter and adjust if necessary. If there has been a dramatic change (0.5 or more), keep checking and amending the soil regularly. 🌐

HOW TO CREATE A STREAMSIDE GARDEN

INCLUDING THE STREAM

BY DAVID B. MELCHERT

During the past century and a half, wildlife habitats in this country have changed dramatically. Forests have been cleared, prairies plowed, marshes drained and streams diverted. Some wildlife species, such as blue jays and robins, have been able to take advantage of these changes and increase their ranges. Others, like the spotted owl and northern parula, have responded to their ever-shrinking habitat by declining drastically in numbers or, worse, becoming extinct.

As gardeners we have the opportunity, and the ability, to offset the increasing loss of wildlife habitat. One of the more productive habitats that can be incorporated in a garden is a streamside habitat. The inclusion of water, even in the smallest setting, will vastly increase the number — and perhaps the variety — of species that frequent an area.

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Streams are common in many natural settings, from deep forests to open fields. They provide a wide variety of habitat features, including moss-covered rocks that provide cover for salamanders and insects and deep water for large fish and birds. Given this diversity of natural settings and habitat features, a streamside garden is appropriate in almost any garden setting.

Planning Your Garden

Your streamside garden should include aquatic, riparian (along the banks) and upland (either woodland or meadow) habitats. Below are some basic considerations that will determine which kinds of habitat improvements you should make:

Special habitat features. The success of your streamside garden will depend on its ability to provide for the specific needs of wildlife common to your area. For example, many salamanders, including the spotted salamander, need proper water pH to reproduce and logs and rocks for cover. The sedge wren is dependent upon sedge meadows of cordgrass (*Spartina patens*), while the yellow-rumped warbler needs spruces and hemlocks for summer breeding and

STREAMSIDE GARDEN FLORA & FAUNA

The following is a list of plants for streamside gardens and the wildlife they're likely to attract.

CANOPY TREES

American beech (<i>Fagus grandiflora</i>)	Wood duck, ruffed grouse, tufted titmouse, fox squirrel, Eastern chipmunk
Balsam fir (<i>Abies balsamea</i>)	Nuthatch, chickadee, red squirrel, porcupine, white-tailed deer, moose
Birch (<i>Betula</i> spp.)	Ruffed grouse, common redpoll, black-capped chickadee, pine siskin, beaver, cottontail, white-tailed deer, moose
Eastern hemlock (<i>Tsuga canadensis</i>)	Pine siskin, white-winged crossbill, chickadee, porcupine, red squirrel, deer
Maple (<i>Acer</i> spp.)	Grouse, bobwhite, evening grosbeak, red-breasted nuthatch, porcupine, fox squirrel, chipmunk
Red oak (<i>Quercus rubrum</i>)	Wood duck, bobwhite, wild turkey, grackle, blue jay, white-breasted nuthatch, brown thrasher, titmouse, red-eyed towhee, racoon, red and gray squirrel, deer
White pine (<i>Pinus strobus</i>)	Mourning dove, chickadee, red crossbill, pine grosbeak, red-breasted nuthatch, pine siskin, pine warbler, Eastern cottontail, gray squirrel, chipmunk, white-footed mouse

bayberry thickets for winter foraging. Before you can create the special habitat conditions that will attract wildlife, you must learn about the species native to your area and their needs.

For aquatic wildlife you'll need to consider the type of stream bottom, the variability of water flow, the average depth of the water and the water temperature and pH. For plants and animals associated with the riparian and upland habitats, special needs include the forest type, plant associa-

tions, the vertical structure of the vegetation, the size of existing live and dead trees, the amount of shade and the quality of the duff layer — the natural layer of soil, leaves and twigs on the forest floor. These features can be woven into your garden's design along with such traditional considerations as proper scale, color and texture.

The size of your garden. All animals require a certain size habitat for feeding, nesting and mating. The size varies with each species; a leopard frog requires only 25

UNDERCANOPY TREES

Mountain ash (<i>Sorbus aucuparia</i>)	Grouse, pine grosbeak, olive-backed thrush, cedar waxwing, purple finch
Pin cherry (<i>Prunus pensylvanica</i>)	Grouse, ring-necked pheasant, evening and rose-breasted grosbeak, blue jay, oriole, mockingbird, robin, brown thrasher, gray-checked thrush, waxwing, pileated woodpecker, red fox, opossum, rabbit, racoon, gray squirrel, chipmunk, moose
Shadblow (<i>Amelanchier canadensis</i>)	Grouse, Eastern bluebird, cardinal, catbird, crow, blue jay, oriole, mockingbird, robin, scarlet tanager, brown thrasher, hermit thrush, downy woodpecker, skunk, red squirrel
Speckled alder (<i>Alnus rugosa</i>)	Goldfinch, common redpoll, pine siskin, beaver, hare, moose
Sumac (<i>Rhus</i> spp.)	Grouse, turkey, bluebird, cardinal, catbird, purple finch, junco, mockingbird, phoebe, robin, scarlet tanager, hermit thrush, warbling vireo, cottontail, deer
White cedar (<i>Thuja occidentalis</i>)	Purple finch, bluebird, pine grosbeak, cedar waxwing, meadow mouse, deer

Continued on page 50

to 100 square meters of habitat, for instance, whereas neotropical migrants such as warblers often require forested areas of more than twelve acres. Thus, the size of your garden will determine the types of wildlife that will visit, and this in turn should govern the specific kinds of habitat that you create.

In general, large gardens will provide habitat opportunities for a greater diversity of wildlife and for larger animals than small gardens. If your garden is large, take advantage of this opportunity and model it closely

after native plant communities to create the best habitat possible.

Whether your garden is large or small, you can "enlarge" it by "borrowing" from a nearby park or natural area. With its linear nature, a streamside garden will function quite nicely as a vegetated corridor which wildlife will use to travel from one area to another. In any case, if your garden can compensate for some scarcity of habitat in your area, its attractiveness to wildlife will be greatly enhanced. The inclusion of water

is often such a major attraction.

The source of water for your stream.

In this age of pumps and man-made liners, it's possible to have a streamside garden almost anywhere. Keep in mind, though, that a man-made stream can be costly to construct and maintain. What's more, some synthetic liners are toxic to fish and other aquatic animals. Consult the manufacturer before you buy.

A natural source of water is preferable to domestic water, which passes through copper or galvanized pipes and is often chlorinated and thus is harmful to fish and other aquatic life. As an alternative, you can take advantage of natural water flow by channeling it into a small ditch or swale. You can reopen a culverted stream. Or you can make minor improvements to an existing wet area or stream channel to create productive habitat that previously did not exist.

Whether water is provided by mechanical or natural means, the type of aquatic habitat you'll be able to create will be determined largely by the consistency of water flow within the stream channel. Intermittent or seasonal water flows make for different kinds of habitat than streams with relatively stable water flows and levels.

A backyard stream needn't have a high level of water to be productive habitat. An intermittent stream, with low water flows,

provides important habitat for insects, amphibians and reptiles, in addition to sources of food and water for migrating birds. An intermittent stream can easily be included in most gardens, even small ones. Larger gardens can have more active streams that sustain larger fish, birds and mammals as well.

Water quality. The chemical and physical properties of water play an important role in healthy aquatic environments. For example, fish and salamanders are sensitive to the pH of stream water. You may need to test the water if you want to attract certain species of wildlife. In general, though, most natural water sources will be acceptable.

Clear water is also important. Natural sources of water may have silt- and nutrient-laden runoff which hinders light penetration. If this is a problem, you can construct a settling pool or small wetland upstream with plants such as cattails (*Typha* spp.), bulrushes (*Scirpus* spp.) and sedges (*Carex* spp.) to help remove silt and nutrients from the water.

Vegetative buffers along the banks of the stream will also protect water quality. Plants with fibrous roots such as red-twig dogwood (*Cornus sericea*) and winterberry (*Ilex verticillata*) will control erosion. Maintaining the duff layer along the stream bank is also extremely important because it will absorb nutrient runoff and silt before they

This stream restoration designed by the author for a home in Maine includes small dams created by developing ledge banks across the width of the stream channel, with "plunge pools" below.



enter the stream. Never replace the natural duff layer with commercial mulch.

Creating Your Streamside Garden

Although our gardens can never fully replace pristine native habitat, they can provide basic food, cover and nesting requirements. The following guidelines will help you create the basic elements of aquatic, riparian and upland habitat in your streamside garden.

Building the Stream

Stream channels operate in a consistent, self-maintaining manner which has been perfected over time until an equilibrium is reached and the channel and its banks become relatively stable. Changes in the physical structure of an existing stream channel will result in a series of downstream adjustments until a new equilibrium is reached. In other words, if you're not careful, your physical habitat "improvements" can actually result in a decrease in habitat quality. Several aspects of stream mechanics — the configuration of the stream channel, width/depth ratios, gradient, stream bank structure and sediment loading — are critical for a healthy stream environment but go beyond the scope of this article. Consult a professional before altering an existing stream channel. To cre-

ate a new stream, you'll need a basic understanding of stream morphology.

Before you start, study natural streams in your area. Pay special attention to patterns of stream flow, bank forms and bottom materials of streams similar to the type you want to create in your garden. Here are some things to consider when you develop the stream itself:

Stream profile. The profile of your stream channel should provide a number of different habitat opportunities. There should be areas of shallower, faster moving water (riffles) as well as areas with calmer, deeper water (guides) and occasional pools. Include wetland areas to accommodate any flooding that may occur. The wetlands will also provide some of the most productive habitat along your stream.

Water depth. Water depth determines which plant associations are appropriate, provides safety from predators and regulates temperatures within the stream. Try to vary the depth of your stream to provide habitat for as many species as possible.

As you're laying out your stream and selecting the plants, keep in mind that certain plant species grow only within a given range of depths. Plants such as duck corn (*Peltandra virginica*) prosper in swampy areas to water depths of one foot, while wild celery (*Vallisneria spiralis*) will grow in



ILLUSTRATIONS BY STRUIDWATER DESIGN GROUP

STREAMSIDE GARDEN FLORA & FAUNA

SHRUBS

Bayberry (*Myrica pensylvanica*)

Yellow dowitcher, grouse, bluebird, catbird, chickadee, meadowlark, tree swallow, towhee, scarlet tanager

Blueberry (*Vaccinium corymbosum*)

Herring gull, grouse, bluebird, catbird, yellow-breasted chat, chickadee, crested flycatcher, blue jay, oriole, phoebe, tree sparrow, scarlet tanager, red fox, opossum, Eastern skunk, chipmunk, red-backed mouse, deer

Canadian rhodora
(*Rhodora canadense*)

Hummingbirds, butterflies, bees

Elderberry (*Sambucus canadensis*)

Pheasant, rusty blackbird, bluebird, indigo bunting, cardinal, catbird, yellow-breasted chat, rose-breasted grosbeak, Eastern kingbird, phoebe, robin, swamp, white-crowned and white-throated sparrow, scarlet tanager, tufted titmouse, veery, wood thrush, waxwing, red squirrel, woodchuck, white-footed mouse, moose

depths of one-and-a-half to ten feet.

Stream banks. Stream banks should be stable and have ample room for plantings. They should fit in with the existing topography and look natural. In well defined channels you can include stabilized "cuts" under the bank to provide cover for fish and other aquatic animals (see the illustration on the bottom of the next page). In cool climates, bank cover can extend into areas of slower-moving water to create bog-like conditions. Over time, peat will accumulate and a floating mat of vegetation, commonly sundew (*Drosera* spp.) and pitcher plant (*Sarracenia* spp.), will form. You should also provide access to the water

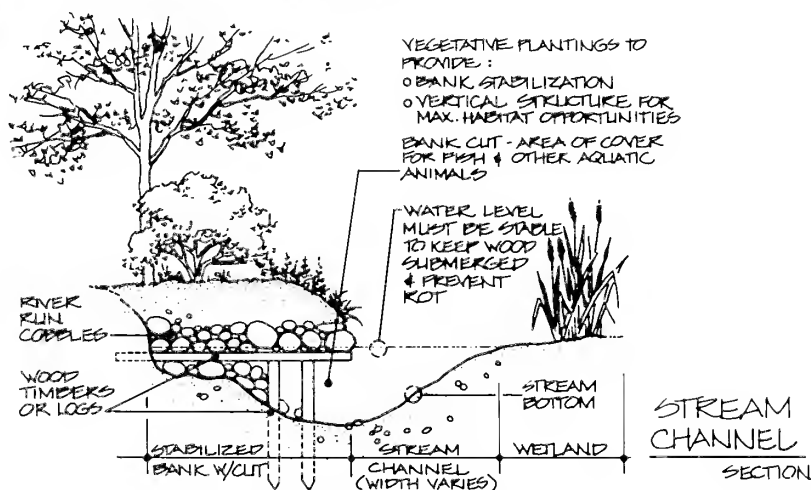
with either a sand bar, ledge or fallen tree, so that animals will be able to drink and bathe. Be careful not to create a sudden drop-off in these areas.

Stream bottom. How do you decide what kind of bottom materials are best for your stream? This will depend on the rate of water flow and the needs of wildlife you're trying to attract. Several types of bottom usually exist in the same stream.

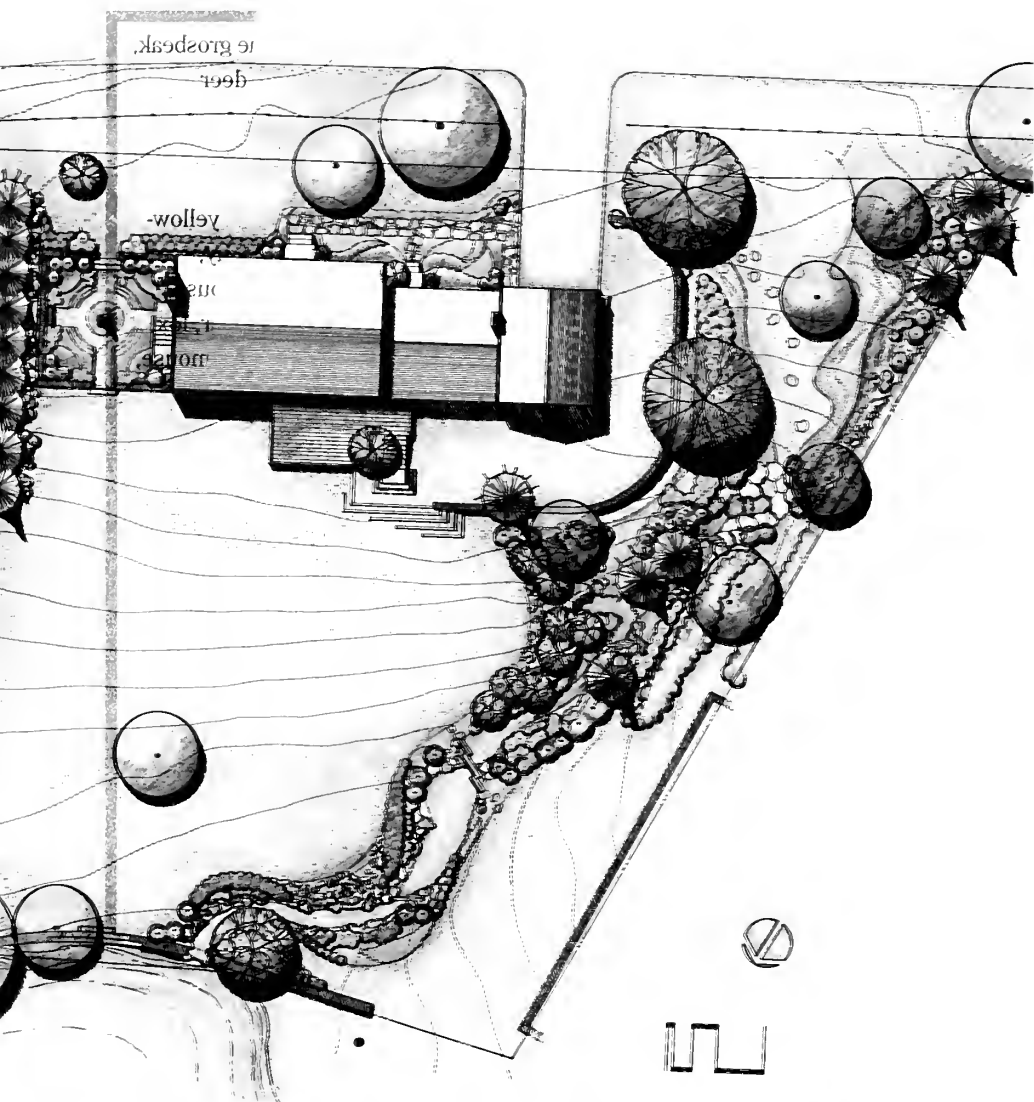
BEDROCK bottoms occur where there is natural ledge. When there is no natural ledge, it's possible to simulate it along the bank or stream bottom to control erosion and provide access to the water for wildlife. Low- and medium-height "dams" along the

Huckleberry (<i>Gaylussacia</i> spp.)	Grouse, white-winged crossbill, pine grosbeak, scarlet tanager, red-eyed towhee, deer
Mountain laurel (<i>Kalmia latifolia</i>)	Grouse, deer
Raspberry (<i>Rubus</i> spp.)	Grouse, bobwhite, cardinal, catbird, yellow-breasted chat, pine grosbeak, blue jay, oriole, robin, Henslow sparrow, titmouse, red-eyed towhee, waxwing, black bear, fox, red squirrel, chipmunk, white-footed mouse, deer, moose
Snowberry (<i>Symphoricarpos</i> spp.)	Grouse, pheasant, purple finch, pine grosbeak, hummingbird, robin, hermit thrush, hare, deer
Swamp azalea (<i>Rhododendron viscosum</i>)	Hummingbird, butterflies, bees
Viburnum (<i>Viburnum</i> spp.)	Grouse, cardinal, robin, gray-cheeked thrush, waxwing, cottontail, skunk, Eastern chipmunk, white-footed mouse
Winterberry (<i>Ilex verticillata</i>)	Black duck, grouse, bluebird, catbird, mockingbird, robin, wood thrush, towhee, cedar waxwing, pileated woodpecker

Continued on page 54



Stabilized "cuts" in the streambank provide cover for fish and other wildlife.



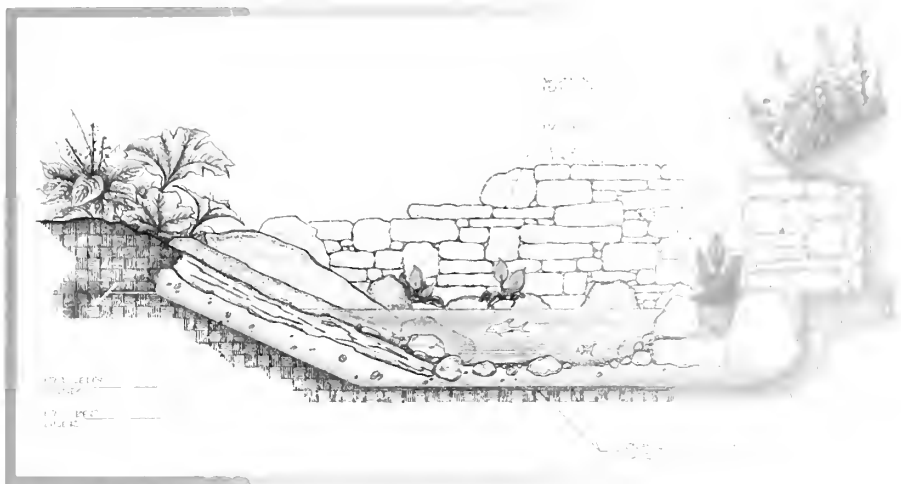
This landscape plan includes the restoration of a stream which had been diverted into a culvert and bulldozed when the home was built.

stream can be developed by creating ledge banks across the width of the stream channel. Below these dams "plunge pools" form, providing cover for fish and increasing the level of oxygen in the water. They also provide pleasant sounds as water rushes across the ledge and tumbles into the pool.

BOULDERS placed in riffles and guides provide cover for fish traveling between pools.

Water velocity increases as the water goes around the rock, creating a "scour pool" at its base where fish can hide. How big the boulders should be depends upon how fast the water flows; the faster the flow, the larger the stones. A general rule of thumb is to use stones two to three feet in diameter.

COBBLES are large rocks, six to eighteen inches in diameter, typically associated with



Even a tiny garden can include a natural-looking woodland pool.

faster-moving water. They provide cover for small fish, insects, crustaceans and amphibians. Cobbles are also useful in controlling erosion and stabilizing streambanks.

GRAVEL provides cover and spawning ground for fish, insects, amphibians and other animals. To spawn, trout and salmon require riffles with an area of clean gravel at least two feet square. Gravel bottoms are common in areas of mild flow and in intermittent streams.

SAND is common on the inside edges of pools where the water slows and particles are deposited. Guides with slower-moving water often have sand bottoms, as do intermittent streams.

MUD bottoms are common in slower-moving waters that traverse fine-textured soils. They provide habitat for reptiles, amphibians, crustaceans, insects and some warm-water fish. Plants readily grow in this type of stream bottom. Consequently, mud bottoms are one of the more productive habitat areas in a streamside garden.

ORGANIC bottoms occur where substantial amounts of leaves or other organic material are deposited. They typically develop in areas where the flushing rate is low. Fallen wood, leaves and other stream

litter provide food and cover for wildlife, and to some extent influence the acidity of the water and add important trace minerals. A properly placed log or decaying leaves will provide habitat for insects, crustaceans, fish, amphibians and frogs. They in turn will attract birds and other predators.

By randomly mixing areas of different depth, water flow and bottom materials in your stream, you can create habitats for a number of plants and animals. The illustration on page 55 shows how these elements can be combined in a stream.

Selecting the Plants

Plant selection for your streamside habitat should be guided not only by your garden location and the types of plants that grow there, but also by the needs of the wildlife you wish to attract. It can't be stressed enough that to attract the greatest number and diversity of wildlife, you need to recreate natural plant associations as closely as possible. Your garden can compensate for any kind of habitat scarcity in your area, such as a food source or shelter in places with bitter winters; you'll greatly boost your garden's ability to attract wildlife. Develop a plant palette that provides for the needs of both permanent residents and temporary visitors. The essential

STREAMSIDE GARDEN FLORA & FAUNA

GROUND COVERS

Bearberry (<i>Arctostaphylos uva-ursi</i>)	Grouse, deer
Bunchberry (<i>Cornus canadensis</i>)	Ipswich sparrow, veery thrush, Philadelphia vireo, warbling vireo
Christmas fern (<i>Polystichum acrostichoides</i>)	Ruffed grouse, hare, white-tailed deer
Mosses	Trumpeter swan, lemming mouse
Wintergreen (<i>Gaultheria procumbens</i>)	Grouse, white-footed mouse, white-tailed deer
Partridgeberry (<i>Mitchella repens</i>)	Grouse, bobwhite, red fox, white-footed mouse

AQUATIC AND EMERGENT PLANTS

Pickeral plant (<i>Pontederia cordata</i>)	Black duck, wood duck, muskrat
Wapato (<i>Sagittaria latifolia</i>)	Black duck, canvasback, mallard, lesser scaup, wood duck, muskrat
Wild celery (<i>Vallisneria spiralis</i>)	Coot, black duck, canvasback, mallard, American goldeneye, redhead duck
Wild rice (<i>Zizania aquatica</i>)	Coot, black duck, bufflehead, pintail, teal, wood duck, redwing blackbird, bobolink, song sparrow

elements of any productive habitat are food, shelter and a place to raise young.

Food. The plants in your streamside garden should provide a broad spectrum of foods for a variety of wildlife. Consider plants not only for the obvious sources of food they provide (fleshy fruits, tubers, nuts and seeds) but also for the "secondary" types of food they attract (insects, snails, fish and other small animals). The tender shoots, buds and seed pods of wild celery are an important food for diving and marsh ducks and provide food and cover for snails, minute insects, plankton and other aquatic

life. Other animals will come to feed on these secondary sources of food. Warblers will be attracted to plantings of maples, alders, birches, dogwoods, hawthorns, oaks and buckthorns, which are good insect-attracting plants. If possible, include dead trees, or snags, in your garden, which are an important source of insects for wildlife.

Shelter and cover. Plants provide shelter from the weather and cover from predators. They offer relief from the midday sun, a place to roost for the night and a refuge from soaking rain, biting wind or freezing cold. In cold climates evergreen trees and shrubs

are a must for wildlife which remain for the winter. Thickets and tangles of hawthorn, native roses such as *Rosa virginiana*, *R. carolina* and *R. palustris* and barberry offer good protection from predators.

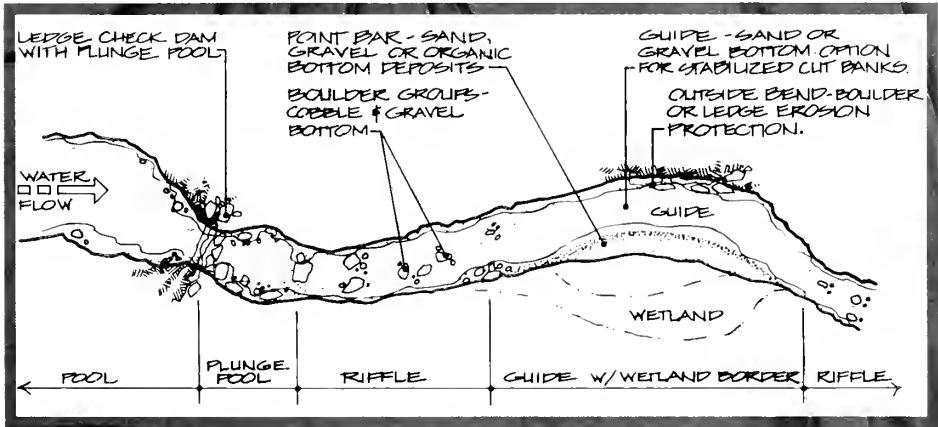
Nesting. Generally, if you include a variety of evergreen and deciduous plants of different heights, wildlife will be able to nest. You can supplement nesting opportunities with brush piles and houses for birds and bats. Dead trees will also provide places for owls, woodpeckers and other species to nest.

Plant associations. Individual species of wildlife have developed specific relationships with plants that provide the foraging and nesting opportunities they need. Species like the northern parula need bogs with hundred-foot-high conifers that have bearded lichen (*Usnea*) for nesting, as well as a deciduous undercanopy for gleaning insects. The Nashville warbler requires moist, open deciduous habitats with moss-covered depressions or dense ferneries for nesting. The Cape May warbler prefers dense spruce-fir forests typically thirty to sixty feet in height. These kinds of species/habitat associations are often disrupted when a natural area becomes a patchwork of urban or suburban gardens. For this reason your stream-

side garden will be most successful as wildlife habitat if you base it as closely as possible on plant associations native to your area. Such associations include a mix of canopy and undercanopy trees, shrubs, ground covers, forbs, grasses and emergent and floating vegetation.

Vertical structure. Developing the vertical structure of your plantings is an important part of habitat creation. Simply put, this means recreating the layered effect of natural vegetation — from the crowns of canopy trees down to the ground covers on the forest floor. Look at the woodlands in your area: Are they canopy woods only or are there one or two intermediate layers of vegetation, such as undercanopy trees and shrubs? The vertical structure of vegetation is important because different species favor different layers for different needs. Northern orioles, for instance, nest in the canopies of tall deciduous trees like maples and forage for food in understory fruit trees and berry patches.

For suggestions on plants for your streamside garden, see the list which begins on page 46. The illustrations on pages 48 and 53 show how all the different elements can be brought together in your garden. 🌐



In your stream, try to randomly mix areas of different depth, water flow and bottom materials.

MEADOWS AND HEDGEROWS

BY EDMUND HOLLANDER
AND MARYANNE CONNELLY



Meadows and hedgerows, especially on subdivided farmland, is a wonderful way to preserve the historic agricultural landscape.



Meadows and hedgerows are easy on the environment—and easy to maintain—because they work with natural succession.

Hedgerows provide privacy from neighbors and habitat for wildlife.

More and more of our clients are turning away from endless stretches of lawn and clipped hedges of privet and yew. They want wildflower meadows and hedgerows instead.

As recently as fifty or sixty years ago, meadow and pasture bordered by dense,

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linear hedgerows was the landscape pattern that dominated the Northeast. Indeed, it's a pattern that dates back to colonial times in the United States and all the way back to the Middle Ages in Britain. Suburban sprawl has obliterated much of our traditional agricultural landscape. Whenever we design a home garden, a horse farm or even a corporate headquarters on newly subdivided farmland, we try to incorporate meadows and hedgerows. It's a wonderful way to preserve the historic agricultural landscape.

When farmland on what was originally forest is released from the rigorous agricultural regimen, it goes through a natural process called succession, with local variation. Understanding this process is critical to the successful establishment of a meadow. Millions of seeds lay dormant in the soil. When the soil is exposed and they are able to grow

minate, there is an explosion of physiologically tough, aggressive annuals like horseweed and common ragweed. In a few years, biennials, many alien species like common mullein and Queen Anne's lace, move in, along with a few wildflowers like asters (*Aster* spp.) and goldenrods (*Solidago* spp.) After five years or so, the meadow is in full bloom with native and naturalized species such as ox-eye daisy (*Chrysanthemum leucanthemum*), black-eyed susan (*Rudbeckia hirta*) and butterfly weed (*Asclepias tuberosa*) complementing the biennials and interspersed with big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*) and switch grass (*Panicum virgatum*). Within a few years seedlings of maple, ash, dogwood, cherry, crabapple, pine and cedar grow up and rapidly transform the meadow into "old field." This is an extremely rich, floriferous blend of trees, shrubs and herbaceous species particularly favored by wildlife. As the canopy trees mature they shade out the grasses, wildflowers, evergreens and shrubs and the land reverts back to woodland from whence it came.

Hedgerows grew up between fields or pastures, usually around fences or stone walls. Mature hedgerows typically included tall canopy species like ash, maple and oak along with understory trees like dogwood, hawthorn and cherry and shrubs such as viburnum, sumac and rose. Wildflowers and grasses bordered the field. Songbirds flourish in this environment, which is a carpet of flowers in spring and a cornucopia of fruits and nuts in fall and winter. This attractive habitat is not only an important food source and migration corridor for wildlife, but also a seed bank for future woodlands.

Planting a Meadow

A successful meadow requires some research. Look to see what's growing in fields around you; particular soil conditions and microclimates determine the

individual species that are best adapted to your area. These should form the basis of your seed mix. While meadows should consist predominantly of plants native to your area, there are no hard and fast rules, and individual favorites usually can be accommodated. Ox-eye daisy will seed itself in, but shasta and other daisies are appropriate as well. After all, natural succession creates meadows which are colorful and exuberant mixtures of both native and exotic species — a kind of ecological melting pot.

The bulk of your meadow should be perennials, plants that come back year after year. Stay away from many commercial "meadow in a can" mixes, which are largely annuals. They'll give a good show the first year, but after that usually require reseeding. Some annuals, perhaps 20 percent, should be part of your seed mix, along with clump grasses like *Andropogon* and *Panicum*.

Another important part of establishing a meadow is preparing the seed bed. Remember, if succession had its way, your meadow would be filled with six-foot-tall ragweed right off the bat. If you have time and patience, you can let nature take its course. What we try to do is skip the first five to seven years of succession, go straight to the "perennial" stage and keep it that way. This can be done mechanically or chemically, but we prefer the mechanical approach. First, cut all the existing vegetation down to a height of three to four inches. Then disk, harrow or rototill the ground to break up the sods and turn under the existing vegetation. Wait several weeks for the seeds in the soil to germinate and then turn them under again. Next, rake the soil lightly to prepare a loose, friable seed bed while creating as little disturbance as possible. Then spread the seed at approximately one half pound per 1,000 square feet. Roll or tamp the seed into the soil to make sure there is good contact and water lightly yet thoroughly.

After watering, add a straw mulch. Wildflower seedlings are as tender and fragile as any other plant. If they germinate and then dry out, they'll die. If you plant in early spring or early fall, there's a good chance that there will be enough rainfall. Be prepared, though, to provide additional water if necessary. After the seeds germinate it's critical to provide them with sufficient moisture.

Your meadow will, in most cases, require some maintenance the first year or two. It's a good idea to remove any unwanted plants like ragweed as soon as they are recognizable. These very aggressive annuals will compete for water and space and can shade out the slower-growing perennials. One solution we've found is to wait until mid-June when the annuals are much taller than the perennials. At that point we either mow or hand cut all the plants above the top height of the wildflowers — usually about twelve inches. This prevents the annuals from going to seed but saves us the trouble of having to pull them out by hand. Once your meadow is established, all that will be required is an annual mowing in late fall to discourage any woody seedlings that have taken hold and aid seed dispersal.

If you have a small yard you can either skip the seeding process entirely or supplement it with container- or field-grown perennial wildflowers planted in the clump and gap patterns typically found in this type of plant association. Wildflower sods are also available.

Planting a Hedgerow

Planting a hedgerow is somewhat simpler, although more expensive and labor intensive. Hedgerows as well as meadows should consist of mostly native species, but you needn't take a purist approach. While the wild crabapple (*Malus coronaria*) is found naturally in a hedgerow, a variety of crabapple cultivars — 'Snowdrift', 'Zumi' and

'Floribunda', for example — can be planted in a new hedgerow. As with the meadow, look and see what's growing in your area. Have the soil tested. Find out if the soil is sandy or heavy with clay, well drained or soggy, acidic or alkaline. Deer browsing may also need to be taken into consideration. Then choose your plants accordingly.

Plant the center or tallest part of the hedgerow with maple, ash, oak, tulip and other canopy trees which grow in your area. We like to plant the more natural clump forms rather than the standard shade tree forms. On either side and among the taller species, plant both flowering and evergreen trees. We typically plant crabapple (*Malus*), hawthorn (*Crataegus*), dogwood (*Cornus*) and cherry (*Prunus*) for both their flowers and fruits. Either red cedar (*Juniperus virginiana*) or white pine (*Pinus strobus*) add an evergreen component to the hedgerow. After the trees are installed you can plant any number of shrubs on the outside edges, including viburnums (*Viburnum* spp.), bayberry (*Myrica pensylvanica*), species roses, shrub dogwoods and sumac (*Rhus* spp.). There really is a great deal of flexibility as far as what will grow in a hedgerow.

Your reason for planting the hedgerow will also influence what species and sizes you include. If privacy is your main goal, include more evergreens. If you're planting primarily for wildlife, include oaks (*Quercus* spp.), hickories (*Carya* spp.) and beeches (*Fagus* spp.) as canopy trees as well as flowering trees and shrubs that provide fruit over an extended period.

The beauty of the hedgerow and meadow is that they work with natural systems. They can accomplish numerous design goals. They can include native species as well as personal favorites. And after some initial care they require very little work — in return for a great deal of beauty. 🌍

NATIVE GARDENS FOR METROPOLITAN NEW YORK

BY STEVEN CLEMANTS



MICHAEL MADIGAN

Dune grass, bayberry, bearberry and scrub oak grow among the dunes in Napeague, Long Island.

Metropolitan New York has many habitats, from broad sandy plains to gneiss and granite outcrops to concrete pavements. What's more, the region spans three hardiness zones. Within this mix of geology and climate many different plant communities have evolved. This great diversity presents endless opportunities for gardeners interested in a natural approach.

I've divided these native plant communities into five broad groups: dunes and beaches; pine-oak woods; oak woods; beech-maple and hemlock-northern hardwood forests; and grasslands. I've left out wetlands because they present many special problems. If you have a natural source of water on your site, by all means incorporate it in your garden; your plant palette will be greatly enhanced.

Because the following communities are so broadly defined, you should explore natural areas near your garden for more precise clues about suitable plants. Another thing to keep in mind is that most of these plant communities occur in patches in a great mosaic, and there are overlapping types of communities that aren't mentioned.

Dunes and Beaches

Dunes and beaches are restricted to the immediate Atlantic coast. Because these areas are continually disturbed by storms,

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PLANTS FOR A DUNE GARDEN

Trees and Shrubs

Post oak	<i>Quercus stellata</i>
Pitch pine	<i>Pinus rigida</i>
Beach plum	<i>Prunus maritima</i>
Sand rose	<i>Rosa rugosa</i>
Bearberry	<i>Arctostaphylos uva-ursi</i>
Bayberry	<i>Myrica pensylvanica</i>
Poison ivy	<i>Toxicodendron radicans</i>

Forbs

Prickly pear cactus	<i>Opuntia humifusa</i>
Beach heather	<i>Hudsonia tomentosa</i>
Seaside goldenrod	<i>Solidago sempervirens</i>
Seabeach sandwort	<i>Honkappa peploides</i>
Seaside spurge	<i>Chamaesyce polygonifolia</i>
Beach pea	<i>Lathyrus japonicus</i>

Grasses

Beachgrass	<i>Ammophila breviligulata</i>
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high tides and offshore winds, few plant species can grow here.

Very few species grow on beaches, and those that do usually colonize the beach naturally. Consequently, it makes little sense to try to garden on a beach; instead, try to keep at least part of it off limits to off-road vehicles so beach species can establish themselves.

On dunes, however, there is more diversity and more opportunity for landscaping. There are usually no trees, but occasionally a stunted post oak or pitch pine. If you enjoy bonsai-like, weathered trees, plant a few. They'll add height to the garden as well as a distinctive look. But your dune garden should be dominated by beachgrass or shrubs. Among the first plants to colonize dunes is beachgrass. On sheltered or older sites shrubs are common, especially sand rose, beach plum, bayberry and poison ivy. Most dunes are a patchwork of bare sand, beachgrass and shrubs. Consider using all three in your garden. One of the biggest problems with dunes is erosion, so it's a good idea *not* to have large areas of bare sand.

PLANTS FOR A PINE-OAK GARDEN

TREES

Pitch pine	<i>Pinus rigida</i>
Scrub oak	<i>Quercus ilicifolia</i>
Dwarf chestnut oak	<i>Quercus prinoides</i>
Scarlet oak	<i>Quercus coccinea</i>
Black oak	<i>Quercus velutina</i>
White oak	<i>Quercus alba</i>
American holly	<i>Ilex opaca</i>
Black gum	<i>Nyssa sylvatica</i>
Sassafras	<i>Sassafras albidum</i>

TALL SHRUBS

Sheep's laurel	<i>Kalmia angustifolia</i>
Mountain laurel	<i>Kalmia latifolia</i>
Swamp azalea	<i>Rhododendron viscosum</i>
Blueberries	<i>Vaccinium</i> spp.

SHORT SHRUBS

Broom crowberry	<i>Corema conradii</i>
Beach heather	<i>Hudsonia tomentosa</i>
Golden heather	<i>Hudsonia ericoides</i>
Pyxies	<i>Pyxidanthera barbulata</i>
Trailing arbutus	<i>Epigaea repens</i>

FORBS

Asters	<i>Aster</i> spp.
Goldenrods	<i>Solidago</i> spp.
Blue-eyed grass	<i>Sisyrinchium</i> spp.
Meadow beauty	<i>Rhexia virginica</i>
Wild indigo	<i>Baptisia tinctoria</i>
Orange grass	<i>Hypericum</i> <i>gentianoides</i>
Rock rose	<i>Helianthemum</i> <i>canadense</i>
Eastern prickly pear	<i>Opuntia humifusa</i>
Butterfly weed	<i>Asclepias tuberosa</i>
Blazing-star	<i>Liatris scariosa</i>
Hawkweeds	<i>Hieracium</i> spp.
Wild sarsaparilla	<i>Aralia nudicaulis</i>
Golden asters	<i>Chrysopsis</i> spp.
Bird's foot violet	<i>Viola pedata</i>

In many areas dunes and beaches are protected. To make major changes you'll need a permit. On the other hand, there may be little problem with adding species to a pre-existing community.

Pine-Oak Woodlands

The woodlands that develop on poor sandy soils are often dominated by pitch pine and a variety of oaks. If you live on the broad, flat, sandy coastal plains of eastern Long Island and southern New Jersey, pine-oak woodland was most likely the original plant community. Occasionally this kind of forest is found inland on glacial outwash and rocky outcrops.

The type of oak species and the ratio of oaks to pine vary by site. In some places the oaks are dominant; in others the pine is nearly the only tree present. In any case, pitch pine and oaks should be the framework of your garden. The choice of oak depends on what specific plant community was in your area and the type of garden you want to create. Scrub oak and dwarf chestnut oak are low growing and will provide a shrubby look. Scarlet oak, black oak and white oak are taller and will cast more shade, but this may restrict what forbs and grasses will grow. All the oaks take many years to reach maturity. If the site already has mature trees, you may want to keep them and start the oaks in the understory. I recommend using a few well spaced pitch pines and possibly a few species of oak.

Pine-oak woods usually have grassy openings with a variety of forbs and small shrubs. Consider creating a garden around such an opening, because you'll be able to dramatically increase your plant palette. As a backdrop, use pitch pines and some of the taller shrubs like mountain laurel, azalea, huckleberries and tall blueberries. In front, mingle shorter shrubs such as heathers, broom crowberry and the shorter blueberries with forbs such as orange grass, asters,

goldenrods, blue-eyed grass and wild indigo.

With proper choices this kind of garden can be colorful year round. In the winter the green of the pine will contrast with the browns of some oaks which retain their dead leaves until spring. Wintergreen, sheep laurel and holly provide additional color. In spring many species blossom, including heathers (yellow flowers), blueberries (white or pink flowers) and pyxies (white flowers). The new growth on the pine together with their male flowers provide a bright green backdrop.

In summer in the pine-oak woods, the laurels produce copious pink flowers. Other blooming species include wild indigo (yellow flowers), lupine (purple flowers), goat's rue (yellow-white marked with purple) and butterfly weed (orange flowers). There isn't a great fall foliage display partly because the pine dominates this forest. However, you can plant other species for fall display, including sassafras for bright splashes of yellow and sumacs and heaths which turn a vibrant crimson. The fall is also a time for many forbs to bloom — the golden asters (yellow), asters (blue), goldenrods (yellow) and blazing stars (rose-purple). Other species set fruit, such as orange grass (orange fruit) and wintergreen (red fruit). Also consider using grasses for fall display, particularly little bluestem which becomes yellow-brown with hints of orange.

Keep in mind, though, that there are several potential problems with planting pine-oak vegetation in a garden setting. First, this plant community is strongly influenced by fire. The best examples burn at regular intervals of 10 to 30 years. Several species have become fire-dependant; some pitch pines, for instance, need fire to shed their seed. Fire also keeps weedy species from encroaching on the native species. Because controlled burning is illegal in many localities you'll have to weed diligently by hand. Second, the soils typical of this vegetation

PLANTS FOR AN OAK GARDEN

TREES

Red oak	<i>Quercus borealis</i>
White oak	<i>Quercus alba</i>
Black oak	<i>Quercus velutina</i>
Chestnut oak	<i>Quercus montana</i>
Pignut	<i>Carya glabra</i>
Shagbark	<i>Carya ovata</i>
Sweet pignut	<i>Carya ovalis</i>
White ash	<i>Fraxinus americana</i>
Red maple	<i>Acer rubrum</i>
Eastern hop hornbeam	<i>Ostrya virginiana</i>

SMALL TREES OR LARGE SHRUBS

Flowering dogwood	<i>Cornus florida</i>
Witch-hazel	<i>Hamamelis virginiana</i>
Shadbush	<i>Amelanchier arborea</i>
Choke cherry	<i>Prunus virginiana</i>

LOW SHRUBS

Maple-leaf viburnum	<i>Viburnum acerifolium</i>
Blueberries	<i>Vaccinium</i> spp.
Red raspberry	<i>Rubus idaeus</i>
Spicebush	<i>Lindera benzoin</i>

FORBS

Wild sarsaparilla	<i>Aralia nudicaulis</i>
False Solomon's seal	<i>Smilacina racemosa</i>
White goldenrod	<i>Solidago bicolor</i>
Hepatica	<i>Hepatica americana</i>
Bellwort	<i>Uvularia perfoliata</i>
Canada mayflower	<i>Maianthemum canadense</i>
Trilliums	<i>Trillium</i> spp.
Trout lilies	<i>Erythronium</i> spp.
Asters	<i>Aster</i> spp.
Goldenrod	<i>Solidago</i> spp.

GRAMINOIDS

Pennsylvania sedge	<i>Carex pensylvanica</i>
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Blueberries of the pine-oak woods turn a vibrant crimson in fall. Autumn is also the time when asters, goldenrods and other wildflowers bloom.



Pyxies (*Pyxidanthera barbulata*) in the New Jersey pine barrens.

type are well drained and dry much of the year. Some species, such as swamp azalea, sheep laurel and blazing star, grow around streams and lakes and may be difficult to grow on higher ground where there is little water. If you had to give the garden constant and massive infusions of water, you'd be defeating the whole purpose of a natural garden. You'd do well to stick to the drier vegetation.

Oak Woods

Throughout the metropolitan area bedrock is close to the surface, forming cliffs, ridges and boulder piles. In these areas, as well as parts of the coastal plain, oak dominates the woodlands. American chestnut used to be codominant in much of the area, but the chestnut blight has reduced or eliminated this species. On dry, rocky ridgetops or in openings in the woods, grassy meadows or pine-oak forests may be present; in these situations the plant community may be identical to, or very close to, the grasslands mentioned below or pine-oak woods mentioned above. On slopes oak-hickory forests or chestnut-oak forests predominate. In protected areas maple-beech forests or hemlock forests are present (see below). In this section, I'll concentrate on the oak-hickory and chestnut oak forests.

Oak forests generally form on well drained, acid and often thin soils. They therefore do not support a rich and varied flora. But don't let that stop you. A number of handsome trees grow with the oaks, including hickories, white ash and eastern hop hornbeam. In the typical suburb you'll be working with an existing stand of oaks surrounded by lawn. In that case you can plant understory trees, shrubs and forbs. Shadbush makes a striking white display very early in spring, before any other shrub blooms. Flowering dogwoods are beautiful tall shrubs in these woodlands (look for strains resistant to dogwood anthracnose);

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other tall shrubs or small trees include witch-hazel and choke cherry. A well spaced and well chosen understory can create a wonderful setting for low shrubs and forbs.

Forbs, especially spring wildflowers, tend to be sparse in these forests because of the acid soil. However, this scarcity makes the appearance of wildflowers all the more exciting. You can space your wildflowers like small jewels to be treasured individually or you can create solid splashes of color. Spring wildflowers in the oak woodlands are often white. They include false Solomon's seal (white), hepatica (white to lavender), bellwort (yellow) and Canada mayflower (white). If your soil is richer, try other species like trilliums and trout lilies. Although there will be some carryover from the spring and fall, there is little that will flower specifically in summer. Fall is peak time for flowers in an oak forest. Asters, goldenrods and other members of the daisy family start flowering in late summer and continue till November. Combined with fall foliage and fruiting shrubs, they provide an autumn display that lasts for months.

Canada sedge is the most common graminoid or grasslike plant in these forests. It forms a dense turf. Consider this species instead of grass in your lawn. It grows only about five inches high, so you won't waste half the summer mowing.

Normally in an oak woods there are pockets of richer, moister soil where a wider variety of plants can grow. These pockets are usually found near the base of a slope or in protected areas. Use rock outcrops or boulders to form small areas of richer plant diversity in your garden.

Beech-Maple and Hemlock-Northern Hardwood Forests

Although oak forests predominate throughout the metropolitan area, beech-maple and hemlock-northern hardwood forests are found on the lower slopes of ravines, on

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An oak forest on Lang Island.

Fall foliage, fruiting shrubs and asters and other members of the daisy family provide an autumn display that lasts for months.

KAREN BLUMER



Bird's foot violet (*Viala pedata*), a good candidate for a pine-oak garden.

PLANTS FOR BEECH-MAPLE AND HEMLOCK-NORTHERN HARDWOOD GARDENS

TREES

Sugar maple	<i>Acer saccharum</i>
Red maple	<i>Acer rubrum</i>
Beech	<i>Fagus grandifolia</i>
Hemlock	<i>Tsuga canadensis</i>
American elm	<i>Ulmus americana</i>
White ash	<i>Fraxinus americana</i>
Yellow birch	<i>Betula alleghaniensis</i>
Red oak	<i>Quercus borealis</i>
Basswood	<i>Tilia americana</i>
Poplars	<i>Populus</i> spp.
Birches	<i>Betula</i> spp.

SHRUBS

Flowering dogwood	<i>Cornus florida</i>
Alternate-leaved dogwood	<i>Cornus alternifolia</i>
Maple-leaf viburnum	<i>Viburnum acerifolium</i>
Hobblebush	<i>Viburnum lantanoides</i>
Striped maple	<i>Acer pensylvanica</i>
Witch-hazel	<i>Hamamelis virginiana</i>

FORBS

Lily	<i>Lilium philadelphicum</i>
Wild ginger	<i>Asarum canadense</i>

Purple trillium	<i>Trillium erectum</i>
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>
White baneberry	<i>Actaea pachypoda</i>
Wild leek	<i>Allium tricoccum</i>
Bloodroot	<i>Sanguinaria canadensis</i>
Blue cohosh	<i>Caulophyllum thalicroides</i>
Partridgeberry	<i>Mitchella repens</i>
Wood sorrel	<i>Oxalis</i> spp.
Round-leaf violet	<i>Viola rotundifolia</i>
Indian cucumber root	<i>Medeola virginiana</i>
Star flower	<i>Trientalis borealis</i>
Foamflower	<i>Tiarella cordifolia</i>
Canada mayflower	<i>Maianthemum canadense</i>
Purple trillium	<i>Trillium erectum</i>
Hepatica	<i>Hepatica nobilis</i>
Trout lily	<i>Erythronium</i> spp.
Rue anemone	<i>Anemone thalicroides</i>
Trillium	<i>Trillium</i> spp.
Dutchman's breeches	<i>Dicentra cucullaria</i>
Bellwort	<i>Uvularia</i> spp.

FERNS

Rock polypody	<i>Polypodium virginianum</i>
Christmas fern	<i>Polystichum acrostichoides</i>

cool, mid-elevation slopes and on moist, well drained sites along swamps. Farther north these forests dominate the landscape.

Beech-maple forests usually develop on acid soils. Sugar maple and beech are the dominant trees but basswood, American elm, white ash, yellow birch and red maple also occur. There are relatively few shrubs and herbs, but characteristic small trees and tall shrubs include American hornbeam, striped maple, witch-hazel, hobblebush and alternate-leaved dogwood. The forbs include blue cohosh, jack-in-the-pulpit, white baneberry, wild leek, wild ginger, false solomon's seal and bloodroot.

The hemlock-northern hardwood forests, like the beech-maple forests, have beech and sugar maple in the canopy. But several other trees may also be present,

including hemlock, red maple, black cherry, white pine, yellow birch, black birch, red oak and basswood. The amount of hemlock can vary from nearly pure stands to as little as 20 percent. Few species grow beneath the dense evergreen canopy of a pure stand of hemlock. Among the few are partridgeberry, wood sorrel and round-leaved violet. Where there are fewer hemlocks the forest can have a wealth of forbs, including Indian cucumber root, Canada mayflower, star flower, bellwort, foamflower and purple trillium.

On sites that once had beech-maple or hemlock-northern hardwood forests but have since been cleared and then allowed to regrow, the forests that first appear, called successional forests, are dominated by poplars, red maple and birches. As these

forests mature the slower-growing beeches, maples and hemlocks grow up and shade out the colonizing species.

Successional forests present a wealth of opportunities for your garden. In the spring before the trees have leafed out, the forest floor is often a carpet of pastels — the greens of new leaves and the many hues of spring flowers such as Canada mayflower (white), hepatica (white to lavender), trout lilies (yellow), rue anemone (white to pink), trillium (white or purple), dutchman's breeches (white) and bellworts (yellow). During summer you can enjoy the lush greens of ferns set against the bright orange of lilies and white of baneberry. In the fall these woods are a kaleidoscope of color — with the brilliant reds of maples, yellows of beeches and browns of oaks.

Grasslands

There are several native grasslands in the New York area, including the Hempstead plains grassland, maritime grasslands and rocky summit grasslands. The little bluestem is a dominant species in all of them.

Maritime grasslands are found on sandy coastal plains within reach of the ocean's salt spray. Although this community is dominated by grasses there are a few wildflowers. Among the notables are Atlantic golden aster, bushy rockrose, hoary frostweed, flat-top goldenrod, white-top aster and pussy's toes. Since maritime grasslands often mingle with dunes and pine-oak woods in the wild, consider creating a mosaic of these communities.

The Hempstead plains grassland once covered approximately 38,000 acres of southern Nassau County, Long Island, but has now dwindled to less than thirty. It was once dominated by the same grasses typical of the Midwestern tallgrass prairie, including big bluestem, little bluestem, Indian grass and switch grass. There was once a

wealth of wildflowers, including wild indigo, dwarf cinquefoil, goldenrods, butterfly weed, stargrass, violets and asters. A few trees were scattered in clumps on the plains.

Rocky summit grasslands are found in the oak forest on the most exposed rocky summits. They are dominated by little bluestem, poverty grass and a few other grasses. Only a few spring wildflowers are found, such as ditty, but there are many fall wildflowers, especially asters and goldenrods. This sort of grassland can make a pleasant counterpoint to an oak forest garden.

The major problem with all of the grasslands is that fire plays an important part in maintaining them. Without fire, exotic

PLANTS FOR GRASSLAND GARDENS

FORBS

Atlantic golden aster	<i>Pityopsis falcata</i>
Bushy rockrose	<i>Helianthemum dumosum</i>
Hoary frostweed	<i>Helianthemum propinquum</i>
Flat-top goldenrod	<i>Euthamia graminifolia</i>
White-top aster	<i>Aster paternus</i>
Pussy's toes	<i>Antennaria plantaginifolia</i>
Wild indigo	<i>Baptisia tinctoria</i>
Dwarf cinquefoil	<i>Potentilla canadensis</i>
Goldenrods	<i>Solidago</i> spp.
Butterfly weed	<i>Asclepias tuberosa</i>
Stargrass	<i>Hypoxis hirsuta</i>
Violets	<i>Viola</i> spp.
Asters	<i>Aster</i> spp.
Dittany	<i>Cunila origanoides</i>

GRASSES

Big bluestem	<i>Andropogon gerardii</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Indian grass	<i>Sorghastrum nutans</i>
Switchgrass	<i>Panicum virgatum</i>
Poverty grass	<i>Danthonia spicata</i>



Butterfly weed contributes bright splashes of color to a grassland in East Patchogue, Long Island.

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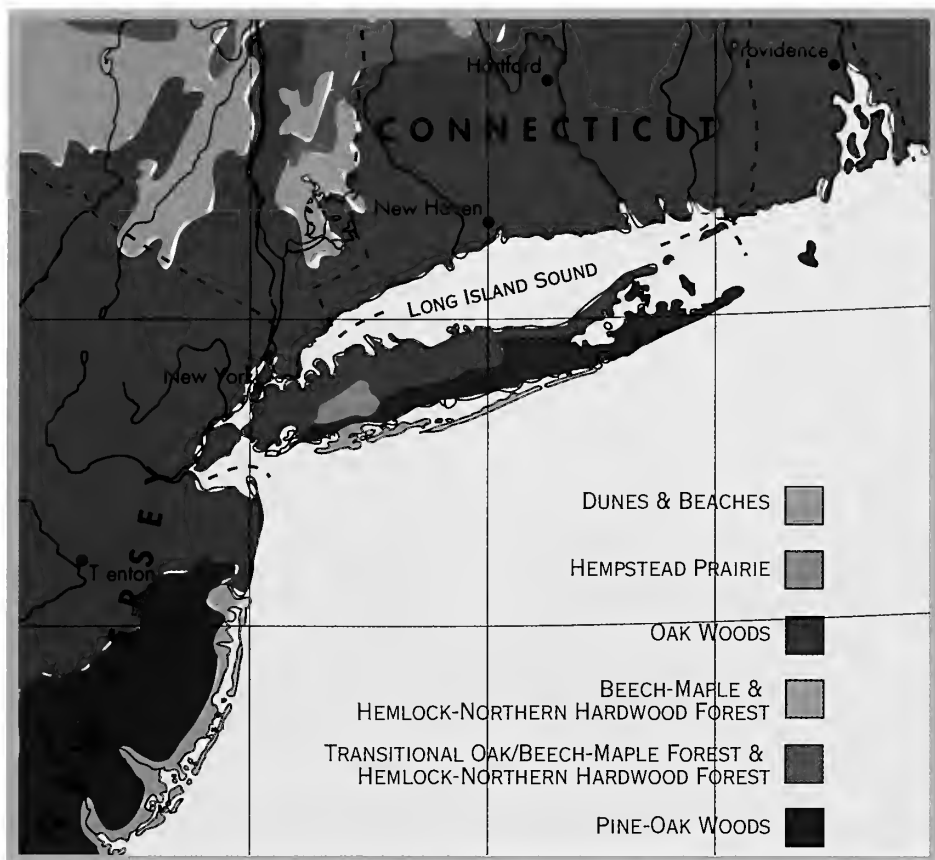
A closeup view of butterfly weed (*Asclepias tuberosa*).

species invade and trees and shrubs begin to sprout. If burning is illegal where you live, you'll need to physically remove unwanted plants or mow the grassland late in the year after the plants have shed their seeds.

Urban Gardens

Recreating a native plant community in the city is a challenge. But if you're persistent, this can be a very rewarding kind of garden.

The first problem is figuring out what the native plant community was. There's little information about the original plant life of most major cities. If that's the case, use your imagination. Use any one of the vegetation types mentioned in this article, but



NATIVE PLANT COMMUNITIES OF METROPOLITAN NEW YORK

make sure it matches the conditions in your garden, particularly soil and the amount of shade. If your garden is on sandy Rockaway or Coney Island, create a dune or maritime grassland community. If it's on a rock outcrop in the Bronx, a rocky summit grassland makes sense. If there are pre-existing trees, particularly native species, create a garden around them. Even if the species aren't native, keep them and plant small natives which will succeed the non-natives. If your garden is surrounded by tall buildings, plant understory trees and tall shrubs which are shade tolerant.

You'll have to experiment, and most likely you won't be able to fully recreate a

native plant community, but you may be able to come close — and have fun trying.

Where to See Examples

You can explore native plant communities in parks, wildlife management areas and nature preserves such as those owned by The Nature Conservancy and the National Audubon Society. Many botanical gardens and arboreta have native plant sections which have been planted by the gardeners. These are proof positive of what you can accomplish in your garden. Some places to visit: Teatown Lake Reservation, Planting Fields Arboretum, Brooklyn Botanic Garden and The New York Botanical Garden.

NATURAL LANDSCAPES FOR SOUTH FLORIDA

BY GEORGIA TASKER

From its cypress swamps and pinelands to its sawgrass prairies and thousand-fingered mangrove fringe, South Florida's biological diversity was once legendary. The relentless development of recent decades has touched all of these areas, in some cases reducing them to ragged fragments. As wild areas have been so drastically reduced, growing numbers of gardeners, landscape designers and environmentalists have turned to the residential landscape as a means of restoring natural systems — if not entire plant communities, then substantial parts of them. Backyards are becoming repositories of habitat and hope.

Pinelands and Hammocks

In low, flat Florida, a ridge of rock juts up along the southeastern coast from Broward and Dade Counties to what is Everglades National Park at the tip of the peninsula. Pines that once grew loftily on this limestone outcropping did so with a particular group of fire-dependent plants that adapted to the rainy season's lightning strikes and the dry

season's withering heat. Seedlings of local slash pine develop a thick tuft of young needles, sometimes called a "grassy stage," and thick bark which insulates the cambium; the native coontie and the prostrate palmetto palm of the understory have subterranean stems from which new shoots emerge after fire prunes the old. The elevation and drainage of the limestone base of these pinelands — some reach five, ten or even fifteen feet above sea level — made them the logical places on which to build. Today, approximately one percent of this ecosystem remains outside Everglades National Park.

Five years ago, people said pine rockland habitat couldn't be restored. However, restoration specialist George Gann-Matzen, a third generation Floridian who has been recreating these pinelands, is now convinced that this ecosystem will be easier and less costly to restore in both backyards and on a larger scale.

Gann-Matzen has worked with Roger and Linda Blackburn to restore their former pineland. Located in suburban Miami, the Blackburns' sprawling single-story home was landscaped with exotic tropical plants around a few mature pines left behind by the developers. As the old pines began to decline, Roger Blackburn tried treating

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them with nutrient injections, but without much luck. Gann-Matzen suggested the Blackburns approach their yard as a whole system rather than one tree at a time.

Working with an overall plan by landscape designer Judith Evans Parker, Gann-Matzen began work in the front, where trees and undergrowth were cleared and needle duff removed to just an inch-thick covering. Gann-Matzen planted small pines, saw palmettos and beautyberries behind the arrival and entry court. Then, they waited.

The palmettos, freed of choking ferns, began to bud and develop new heads. Small pinelands herbs reappeared — ground cherry, pineland croton, coontie, gopher apple, three-seeded mercury. These species rapidly filled the open spaces, probably utilizing the leftover fertilizer in the topsoil. Now that initial spurt has stopped. Gann-Matzen believes that everything in the seed bank has come in, and the next step is to bring in additional plants to increase the diversity.

One difficulty in restoring a residential pineland is the need for periodic burning. When they caught fire naturally, the pines were kept free of invading hardwoods, and pine seeds germinated in ash-filled limestone pockets. Fire also nipped back shade-casting heads of the saw palmettos, creating sun-filled spaces for wildflowers and forbs such as white-topped sedge, wild petunias, blazing stars and rattleboxes. Burning now is a sensitive issue in residential neighborhoods. At the Blackburn residence, clearing has been done by hand. Gann-Matzen says that he'll keep cutting and hand pulling if he doesn't get permission to burn from the state and county. He anticipates he will get permission to at least use a propane torch. In any event, the Blackburn landscape is already the oldest pineland restoration done without fire, and Gann-Matzen is convinced that it works aesthetically and ecologically.

At the drive's edge and entrance to the Blackburn property, a group of exotic

pongam trees has been allowed to remain, serving as nurse trees for the shade-loving juveniles of the hammocks. Hammocks are islands of hardwoods surrounded by different plant communities, usually pine or freshwater marsh. If pinelands are kept free of fire, they will gradually become hammock.

Behind the Blackburn's swimming pool, another hammock has been planted to screen the area from a neighboring two-story house. At the edge of the swimming pool, in planters that once held exotic birds of paradise and ferns, small trees and shrubs native to the Florida Keys now grow. The Keys plants are slower growing, and it is possible to look through them to the woods beyond. They include *lignum vitae*, *Guaiacum sanctum*, a prized tree that has sky blue flowers in early spring and wood that once was thought to produce a cure for syphilis; maidenbush, *Savia bahamensis*; *Guettarda scabra*, a tough plant called velvet seed; and the brittle thatch palm, *Thrinax morrisii*.

Another perimeter buffer has been created using shrubs of the pineland fringe: firebush (*Hamelia patens*) with tubular flowers that are magnets for butterflies; vivid green myrsine; white indigo berry, which produces ivory-skinned berries from which indigo dye is made; and spicewood, also called the pale-lid flower.

The cost of this kind of restoration is about \$2,000 to \$3,000 per one thousand square feet, depending on the size of the plants, the amount of labor required to remove exotics and the extent of the restoration.

Roger and Linda Blackburn have been willing to work at the maintenance of their acre in order to attain a high level of diversity. According to Gann-Matzen, gardeners interested in ecological restoration are so willing to get down on their hands and knees and work at it that it is possible to maintain extremely high levels of diversity. "We could maintain 200 to 300 taxa here



ABOVE: A picnic area nestled in Thelma Thomas's hammock garden. A bed of gamagrass (*Tripsacum floridanum*) was planted over the septic tank.

RIGHT: On a half-acre in Miami, a pineland was restored. A peach and aqua trellis and dwarf gamagrass lead the way to the door.



GEORGIA TASKER

without a problem," he says. "Basically, that's equivalent to a ten-acre preserve."

A Hardwood Hammock Garden

Thelma Thompson, George Gann-Matzen's grandmother, lives on a 75x130 foot lot in Homestead, Florida, about thirty miles south of the Blackburn home. Mrs. Thomas's house is in a neighborhood of small, single family homes with yards that are open to the street and without a lot of fussy landscaping. Landscape architect Peter Strelkow, past president of the Dade County Chapter of the Florida Native Plant Society, designed a native garden that provides the woody feel Mrs. Thomas wanted. The garden is based on a Florida Keys plant community.

Homestead is within a few miles of Key Largo, the northernmost key. According to

Strelkow, the proximity, the need for small trees — blown by ocean winds and growing on fossilized coral reefs, hammocks of the northern keys are delicate and short — and the aesthetics of the garden justified the creation of this kind of landscape.

Mrs. Thomas's hobby is gardening, and she has an extensive bromeliad collection. Strelkow placed these plants so that she is able to see them from the house. Mrs. Thomas is also a butterfly lover, and the non-native pentas planted around windows unfailingly attract the native zebra butterflies with black and yellow striped wings and an occasional swallowtail as well.

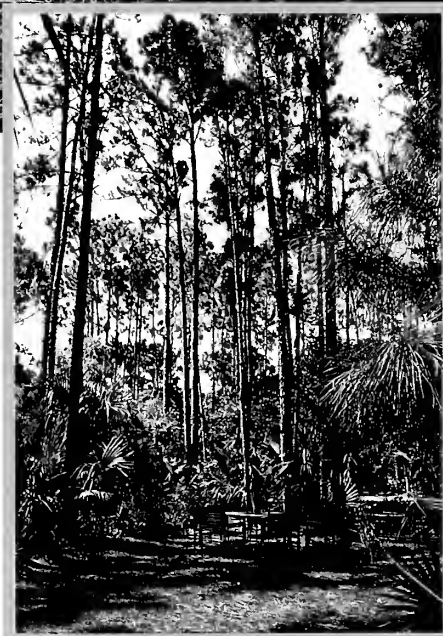
All of the grass in the backyard was cleared, and three to four inches of mulch was brought in. Because the back was fenced, the clearing had to be done by hand. Most plants were three to five feet tall



when planted, although some trees were twelve to fourteen feet. Maintenance is simply a matter of weeding. Once established, the natives do not need fertilizer; the soil is naturally replenished by the humus created from the mulch and by falling leaves. Water is required only during long dry spells.

As is the case with natural hammocks, this tiny shaded forest is cooler in summer and warmer in winter than the area beyond its protective canopy. Among the trees used here are milkbark, *Drypetes diversifolia*, with whitish bark; paradise tree, *Simarouba glauca*, whose beautiful, shiny pinnate leaves are easily identifiable in the forest; pigeon plum, a source of food for white-crowned pigeons; crabwood, *Sapium lucida*, with the tiniest of notches on the leaf margins; Simpson stopper, with small, rounded leaves; and West Indian cherry.

GEORGIA TASKER



This restored pineland in suburban Miami used to consist of exotic tropical plants beneath a few sickly pines left behind by the developers.

PLANTS FOR PINELAND AND HAMMOCK RESTORATION

PINELAND AREAS

<i>Acalypha chamaedrifolia</i>	Three-seeded mercury
<i>Callicarpa americana</i>	Beautyberry
<i>Chamaesyce deltoidea</i> subsp. <i>deltoidea</i>	Deltoid spurge
<i>Chaptalia dentata</i>	Pineland daisy
<i>Cirsium horridulum</i>	Purple thistle
<i>Coccothrinax argentata</i>	Silver thatch palm
<i>Crossopetalum ilicifolium</i>	Quailberry
<i>Crotalaria pumila</i>	Rattlebox
<i>Crotalaria rotundifolia</i>	Rattlebox
<i>Croton linearis</i>	Pineland croton
<i>Dichromena floridensis</i>	White topped sedge
<i>Dyschoriste oblongifolia</i> var. <i>angusta</i>	Twinflower
<i>Erythrina herbacea</i>	Coral bean
<i>Eustachys petraea</i>	Fingergrass
<i>Flaveria linearis</i>	Yellow top
<i>Heliotropium polyphyllum</i>	Pineland heliotrope
<i>Heterotheca grandiflora</i>	Silk grass
<i>Jacquemontia curtissii</i>	Pineland morning glory
<i>Lantana involucrata</i>	Pineland wild sage
<i>Liatris laevigata</i>	Blazing star
<i>Licania michauxii</i>	Gopher apple
<i>Morinda royoc</i>	Yellow root
<i>Passiflora suberosa</i>	Corky-stemmed passionflower
<i>Physalis viscosa</i>	Ground cherry
<i>Pinus elliottii</i> var. <i>densa</i>	South Florida slash pine
<i>Piriqueta caroliniana</i>	Piriqueta
<i>Pteridium aquilinum</i>	Bracken fern
<i>Pteris longifolia</i> var. <i>bahamensis</i>	Ladder brake
<i>Quercus minima</i>	Dwarf live oak
<i>Quercus pumila</i>	Running oak
<i>Randia aculeata</i>	White indigo berry
<i>Rhus copallina</i> var. <i>leucantha</i>	Southern sumac
<i>Ruellia caroliniensis</i>	Wild petunia
<i>Sabal palmetto</i>	Cabbage palm
<i>Serenoa repens</i>	Prostrate palmetto palm
<i>Solidago chapmanii</i>	Chapman's goldenrod

A Pineland in Miami

More recently, Strelkow reestablished a pineland in front of Raul and Irene Martinez's half-acre home in Miami. There were eight or nine existing pines soaring to nearly forty feet, but there was no understory, no mid-level or small pines — just a ground cover of exotic plants. When the weeds were removed, Strelkow found

that a fair number of palmettos remained.

On the street side, Strelkow wanted to make an impact, so he planted bright purple queen (*Setcreasea pallida*) to contrast with the *Cassia chapmanii*, a native pineland shrub with yellow flowers. About fifty small and medium pines were planted, along with additional palmettos and beautyberry shrubs. In this garden, the pineland has paths through it. It is a bit manicured, not as wild as in nature.

<i>Sorghastrum secundum</i>	Lopsided Indian grass
<i>Stillingia sylvatica</i>	Queen's delight
<i>Trichostema dichotomum</i>	Blue curls
<i>Tripsacum floridanum</i>	Florida gamagrass
<i>Zamia pumila</i>	Coontie

HAMMOCK AREAS

<i>Bursera simaruba</i>	Gumbo-limbo
<i>Calyptanthes pallens</i> var. <i>pallens</i>	Spicewood
<i>Cassia ligustrina</i>	Privet cassia
<i>Chiococca alba</i>	Snowberry
<i>Chrysobalanus icaco</i>	Cocoplum
<i>Chrysophyllum oliviforme</i>	Satinleaf
<i>Coccoloba diversifolia</i>	Pigeon plum
<i>Dipholis salicifolia</i>	Willow bustic
<i>Erythrina herbacea</i>	Coral bean
<i>Eugenia axillaris</i>	White stopper
<i>Ficus aurea</i>	Strangler fig
<i>Ficus citrifolia</i>	Short-leaf fig
<i>Galium hispidulum</i>	Bedstraw
<i>Ilex krugiana</i>	Krug's holly
<i>Mastichodendron foetidissimum</i>	Mastic
<i>Myrcianthes fragrans</i> var. <i>simpsonii</i>	Simpson stopper
<i>Myrica cerifera</i>	Wax myrtle
<i>Myrsine guianensis</i>	Myrsine
<i>Nectandra coriacea</i>	Lancewood
<i>Nephrolepis exaltata</i>	Boston fern
<i>Parthenocissus quinquefolia</i>	Virginia creeper
<i>Persea borbonia</i>	Red bay
<i>Polypodium polypodioides</i>	Resurrection fern
<i>Prunus myrtifolia</i>	West Indian cherry
<i>Psychotria nervosa</i>	Shiny-leaf wild coffee
<i>Psychotria sulzneri</i>	Soft-leaf wild coffee
<i>Quercus virginiana</i>	Live oak
<i>Randia aculeata</i>	White indigo berry
<i>Tillandsia fasciculata</i>	Wild pine
<i>Zamia pumila</i>	Coontie

NOTE: The above list includes some of the species that have been or will be planted in the Black-burn garden in suburban Miami.

In the heavily planted front and side yards, restored pines are surrounded by bands of pineland shrubs and edged with colorful tropicals. To show visitors the way to the door, Strelkow designed a giant trellis in aqua and peach — a strikingly modern complement to this ancient landscape. He planted the vertical posts with a native pineland morning glory.

Experts admit that small restorations

such as these will not duplicate nature, but they are hopeful that they can reestablish the look and feel of vanishing native vegetation, and include enough native species to sustain some of the local wildlife. "We obviously won't be able to save the big mammals, the deer and the Florida panthers and the bears," said Gann-Matzen. "But we can go a long way to saving the plants, the insects and the birds." 🌍



A backyard prairie in Lake Forest, Illinois, designed by the author.

PRAIRIE GARDENS

BY P. CLIFFORD MILLER

I'm on my back in a sea of big bluestem, looking under the leaves of a milkweed for larvae of the monarch butterfly.

Black-eyed susans, wild bergamot and yellow coneflowers surround me, colorfully framing the blue sky above. My three-year-old daughter sits on my chest, bemused by

the sight of her father lying prostrate on the prairie. A mallard spies us just before landing on the small pond nearby and veers sharply away, loudly voicing his disapproval of our presence. A song sparrow is chipping in the bur oaks nearby. I'm not in a nature preserve but rather in my own backyard, enjoying but a few of the many pleasures a prairie garden brings.

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Whether your property is a 50-foot-wide city lot like mine or a 200-acre field, a prairie garden can be yours to enjoy as long as you have plenty of sunshine and a willingness to

step off the well worn path of English and formal gardening.

The term prairie, from the old French word "prairie" meaning meadow, is loosely used to cover many ecosystems that are primarily dominated by grasses and forbs. Three hundred or more species may be present. In a prairie, woody plants take a back seat to the spectacular variety of native perennial grasses and herbaceous plants. There are mixed grass, palouse and coastal prairies as well as valley grasslands, desert grasslands and prairie savannas. In the central Midwest where I live, the tallgrass prairie used to dominate. However, only one-tenth of one percent of our original landscape remains, and only a fraction of that is virgin prairie. It is the tallgrass prairie and prairie savanna that I'll be referring to hereafter. But the same design prin-

ciples can be applied to all prairie gardens.

Evaluating the Site

Whether you're creating a prairie from scratch or restoring a degraded one, the first step is a thorough site evaluation. You'll need to determine the type of soil you have, average moisture levels and availability of sun. Is the soil gravelly, sandy loam or predominantly clay? Perhaps you're fortunate enough to have one and a half feet of topsoil as the old tallgrass prairie did. If your site is on a rise where crops used to be grown, all or most of the topsoil may have long since eroded away. Digging a hole a couple of feet deep in various areas around the property can help you assess the condition of your soil. On too many sites I have found the original soil buried under a foot or more of clay backfilled around the house and compacted



In the front garden of the house on the opposite page, a sea of black-eyed susans in bloom.

with heavy machinery. This soil will be quite different from that on the undisturbed portions of your property. Map these different soil types on your site survey.

Include information on soil moisture as well. Is there a low spot that holds water for a day or two after rain? Do you have swales to channel the water off your site? Where does the rain water from your gutters go? I find it beneficial to put on a raincoat and spend time on the property during a storm. The bigger the storm the better. In fact, do this during several storms until you thoroughly understand water movement on your land. Low areas should be recorded on your plan as they may require a special type of planting. Many grasses and forbs require high levels of soil moisture to flourish — cord grass (*Spartina pectinata*), joe-pye weed (*Eupatorium maculatum*) and wild iris (*Iris virginica shrevei*), for example. In many conventional gardens, wet areas are problem areas that end up being drained or filled. I consider moist depressions an asset as they increase not only the plant species that you can use but the diversity of wildlife you will attract. For this reason I often create a depression if none exists. At my own house I partially blocked a drainage swale to create a home for moisture-loving plants. Be careful not to block up drainage too much or you may have an irate neighbor on your hands.

If you have no trees on your land, too little sunlight will not be a problem. But if trees do exist and you plan on leaving them, make sure you take into consideration the lower light conditions underneath them when you choose plants. Most prairie plants that tolerate some shade are also found in the savanna, a related plant community with scattered trees, particularly bur oaks (*Quercus macrocarpa*), magnificent trees with broad, spreading crowns, thick corky bark and leathery dark green leaves. The savanna would make an excellent ecological

model for plantings under existing groves or scattered trees. Densely treed areas will require thinning or the use of a different ecological model such as woodland. Switch grass (*Panicum virgatum*) and wild ryes (*Elymus canadensis* and *E. virginicus*), shooting star (*Dodecatheon meadia*), smooth blue aster (*Aster laevis*) and golden alexander (*Zizia aurea*) are prairie and savanna plants that tolerate some shade. The north side of any structures, including fences, will also be subject to varying degrees of shade. Map these areas on your plan as well.

Next, inventory the existing plants on your property. Determine which, if any, will remain. If your site is an old meadow dominated by Eurasian weeds and grasses with just a few of the more aggressive native forbs like *Helianthus* or *Monarda* species, you'll be better off removing everything and starting anew. The same will probably be true if you're converting a section of bluegrass lawn to prairie.

Designing Your Grassland

Before proceeding any further you should consider other criteria — the size of the area you plan to work, how much time and money you have to devote to the project and whether the plants or seeds for the type of prairie you want are available. To choose the most appropriate plant community for your property, combine this information with the physical data on your site you've already put together. Obviously if you have a low, poorly drained site with heavy clay soils, it would not be a good idea to create a dry prairie usually found on gravelly knolls. If you're stubborn enough — and have plenty of money to spend — you can build a dry prairie on a wet site; it will just take many truckloads of gravel and bulldozers to move it all. It makes ecological sense to let your soil dictate, at least in part, what your final planting choice will be.

Existing vegetation is also a factor. For example, if a site has a few scattered ancient oaks but is dominated by old pasture plants predominantly alien in origin, I see the perfect spot for a savanna garden — I certainly wouldn't topple the oaks for a tallgrass prairie. On the other hand, if the site was in a secondary succession stage — say, an old pasture now dominated by pioneering woody species like cottonwood, ash and elm — I'd probably rip it all out and put in a moist prairie. One of the pitfalls of designing from an ecological community approach is that you tend to become something of a plant snob. Plants from "the wrong side of the tracks" (that is, alien) tend to be scorned, and often destroyed. Even some of the more aggressive natives start to show up on your unwanted list.

Obviously, it's important to have a good understanding of the prairie communities suitable for your area. If you don't, take the time to learn about them or hire someone who does know. Most of the better prairie seed or plant suppliers have lots of free information (see the list at the end of the article). If you can, get out and explore a natural prairie nearby. Note what it is you like about the prairie. Is it the broad sweep of grasses undulating in the breeze, the openness of the expanse or the myriad of flowers and continually shifting colors? Be sure to incorporate these features in your plans. Include your favorite prairie plants in the seed mix if they're appropriate for your site.

Planting Your Prairie

Preparing the site is the first step in the construction of a prairie. Removing all unwanted vegetation is the first task at hand. You can do this a couple of different ways. In small areas you can smother existing vegetation, for example a bluegrass lawn, by covering it with several layers of newspaper weighted down. Sheets of plastic

or even old boards will work if left in place long enough. Removal of all roots and crowns and repeated tilling as weed seeds sprout is another alternative. If you are going to use potted or bare root plants, you're now ready to plant. If you're seeding, it would be a good idea to prepare a good seed bed by raking. I usually use three to five pounds of forb seed with four to five pounds of grass seed per acre. Others recommend up to 20 pounds per acre of forbs and no more than ten pounds of grasses. Due to the high cost of forb seed, I find this impractical. On small plots I may up my ratio of forbs to seeds a bit.

Spread the seed by hand, with a spreader or, on large areas, an agricultural seed drill modified for prairie seed. All of our smaller sites (under one acre) are done by hand or with a regular seed spreader. The spreader works best if you first mix the seed with slightly moist sand. This suspends the smallest seeds evenly with the largest ones, prevents them from dropping out early and ensures an even spread of the mix. The sand also lets you see where you have already seeded as you go along. Lightly rake the seed into the prepared bed and, if practical, mulch it. On a small area, grass clippings spread lightly will suffice. Do not water the garden unless you're in the midst of a drought. Water and fertilizer usually end up benefitting the annual weeds more than anything else. Do not use straw or hay unless it is weed and seed free, which is doubtful. Many are the seed beds mulched with straw I've seen which turned into old hayfields.

I highly recommend using a cover crop. Oats work well. They come up quickly, provide protection for the young prairie plants while also holding the soil in place and do not cast too much shade. Twenty to thirty pounds per acre should suffice. Canada wild rye used at the rate of five pounds per acre is a good longer-term cover crop that won't



Bright orange butterfly weed and violet-purple prairie clover against a canvas of green grasses in an Illinois garden.

persist like some of the perennial ryes will. Some people like to use perennial rye to increase the vegetative mass until the prairie becomes established. This allows you to burn the prairie sooner, providing more fuel for the fire.

Burning is the primary long-term maintenance tool for prairie gardeners. Fire was probably the single most important reason that prairies dominated so much of the Middle West. Whether set by lightning or Native Americans, these huge blazes roared across miles of land, causing little damage to the herbaceous species but killing all the woody plants. The line where forest met the prairie would undulate throughout the years as a direct result of the frequency of fire.

Prairie Maintenance

Prairies need remarkably little maintenance, especially once they are established. As mentioned above, don't fertilize or water the garden if you've seeded. If the oats come up well you know that enough moisture is present for the prairie plants. Plugs or bare-root plants will

require watering the first year.

It is a good idea to mow your prairie garden two to four times the first year to prevent weedy annuals from choking out the smaller prairie plants. Do not cut any shorter than six inches high. Mow once in early June the second year and then, if everything goes well, you should be able to begin burning in the spring of the third or fourth year. In the meantime, you can remove weeds — very carefully — so you don't disrupt the prairie seedlings. And you want to disturb the soil as little as possible so the pesty annuals can't seed themselves in. Sometimes it's best to just leave it alone and give it time.

If you are unable to burn for safety, health or legal reasons, mow the prairie once a year in late fall or early spring. If you can burn, do it at least every two or three years. I prefer early spring, weather permitting, since that allows wildlife to use the prairie as cover and a food source through the winter. If the prairie is larger than one acre, I usually only burn half of it every other year so as not to disrupt wildlife too much.

Do not take a prairie fire lightly. Before burning, make sure you have plenty of water, wet brooms, rakes and other people to assist you. Protect any adjacent property with fire lanes. Bluegrass lawns or pathways, driveways, tilled earth, rivers or roads are all adequate firestops. Be sure to protect any nearby woody plants from the heat of the fire. If you're creating a savanna and have planted small trees, cut away any heavy duff accumulation from around the base of each tree and spot burn a ring at least ten feet across with the tree in the center. Older, larger trees native to savanna areas like bur oak and shagbark hickory (*Carya ovata*) are tolerant of fire and need no protection.

Once your prairie is established, occasional burning will be the only maintenance required. However, many things can and do go wrong during the establishment period. In certain areas the seed may not take well and you may have to reseed them. Remember, the prairie plants may take three years or more to become established, so give it time. Certain aggressive natives like prairie coreopsis (*Coreopsis tripteris*) and some *Solidago* and *Helianthus* species may take hold very fast and choke out less aggressive plants nearby. Removal and reseeding may be necessary. In my own prairie garden, now six years old, I've just completed a season of this type of control; it will be three more years before I know if I've been successful.

I've yet to come across an insect that I would consider a pest in my prairie, so I don't recommend the use of insecticides. Insects are an integral part of the prairie garden and usually coexist nicely with the plants. Some of the most beautiful creatures in my prairie are insects and it can be fun observing their habits.

My prairie garden is by far the richest and most diverse part of my yard. As small as it may be, it provides food and shelter for wildlife, a constantly changing palette of color, countless bouquets for the home and

a source of great pleasure. Each time I wander through it I discover something new. Put native plants together to form an ecological community and amazing things can happen. Keep an eye out for your first monarch larva on the underside of a milkweed leaf.

S U P P L I E R S

There are hundreds of prairie forbs and grasses. The following suppliers can provide you with extensive plant lists as well as the seeds and plants themselves. They're also excellent sources of advice on which species are most suitable for your site.

THE NATURAL GARDEN
38W443 Highway 64
St. Charles, IL 60175
Plants and seeds

COUNTRY ROAD GREENHOUSES, INC.
P.O. Box 62, RR 1
Malta, IL 60150
Plants

LA FAYETTE HOME NURSERY, INC.
LaFayette, IL 61449
Seeds

PRAIRIE NURSERY
P.O. Box 306
Westfield, WI 53964
Seeds and plants

PRAIRIE RIDGE NURSERY
R.R. 29738 Overland Road
Mt. Horeb, WI 53572
Seeds and plants

NORTHWIND NURSERY
P.O. Box 95
Springfield, WI 53176
Plants

A GARDEN FROM THE COAST OF CALIFORNIA

BY JUDITH LARNER LOWRY

Here on the coast of California thirty miles north of San Francisco, an enchanting array of plants from dune and bluff, chaparral and grassland is a magnet for tourists, botanists and wildlife. Yet most of the gardens in my little town are bereft of the native flora. In many of the vacant lots, invasive plants, some introduced by gardeners, have pushed out native plant communities and their associated insect, bird and mammal life, creating virtual biological deserts.

It's challenging to try to piece together a picture of what this area may have looked like before grazing, tree removal, suppression of fires and the invasion of exotic plants. For years I've roamed the surrounding Point Reyes National Seashore and Golden Gate National Recreation Area searching for clues. Oral histories in our local museum have provided the stray comment on the original plant life. "Wildflowers everywhere," said one. But which ones? Old photographs show mostly grasslands, but before grazing and firewood cutting, some said that the coast live oak (*Quercus agrifolia*) as well as

buckeyes (*Aesculus californica*) and coffeeberries (*Rhamnus californica*) were common. So an enjoyable, and ongoing, kind of detective work has produced the plant list for my California coastal garden.

My house is a quarter mile from the ocean in the town of Bolinas. The garden is a flat and rectangular quarter acre. It includes a coastal flower border ten feet wide and seventy-five feet long, and a section for coastal prairie plants. Plants from coastal prairie, chaparral and dune mingle in my garden — as many of them intergrade naturally in the wild as well. Initially the plants came from various native plant nurseries in the Bay Area. Recently, most of them have come from plants we've grown ourselves from locally collected seed. They also supply our mail-order seed company which specializes in California natives.

Chaparral and Prairie

The hills and plains around Bolinas are partially mantled with a scrub community known as coastal chaparral, which occurs in regions near the coast with mild, wet winters and dry summers. Chaparral is comprised of low-growing shrubs, herbaceous perennials and annuals. Plants typical of the adjacent dunes and inland scrub are sometimes intermixed. The plants of both the

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scrub and dunes are closely spaced, creating a dazzling tapestry of greens of subtly contrasting textures. Low-mounded plant forms predominate, kept compact and shapely by the sun and wind.

In the garden, I've used this mounding carpet of grays and greens as a model. I've grouped together some of the larger shrubs from the coastal chaparral, like coyote bush, to create keynotes and restful places for the eye. Growing nearby, and also in our garden, are a groundcover form, a medium-sized shrub and a tree-like form. All provide rich medium-green foliage and a late-blooming flower that is one of the only sources of nectar for insects in the fall. Though many gardeners remove it from their gardens, coyote bush is indispensable habitat for insects and birds and small mammals and can be placed and pruned so as to tie the garden in with the surrounding native landscape.

Growing with coyote bush are the California sage and sticky monkeyflower. It's been said that you can't talk about California without talking about the sage, so evocative and typical are its soft silvery wands of foliage, its fragrance and its indescribable sage-green color. A hillside with a mosaic of coyote bush, monkeyflower and California sage rests an eye wearied from the drama of pounding surf and dazzling blue sky.

Though it is a plant from the southern coastal scrub, I couldn't resist introducing *Salvia leucophylla* to our north-central coast garden. Its lavender flower spikes are lovely, and so is its foliage, which is silver-gray and fragrant. It is a wide-spreading shrub, growing quickly into the tightly woven mosaic of grays and blue-greens that is characteristic of the coastal scrub.

On either side of the back gate resides *Solanum wallacei* from the Channel Islands, a leaning shrub with large purple flowers eight months of the year. A favorite of visitors to the garden, it has a somewhat disturbing tendency to spread by under-

ground runners when it is content. These runners can easily be dug and given to admirers, but I would hesitate to introduce this plant into a natural area.

Although we like the garden bared to sun and wind to keep the coastal natives shapely, some areas require a more sheltered feeling, and it is here that we've introduced some of the taller coastal shrubs and small trees which, with their rounded forms and appropriate heights, have much to offer coastal gardeners. The Monterey pines and Monterey cypresses routinely planted in this area have proven a disaster. Although they grow to the size of forest trees, their root systems do not match their above-ground bulk, and they become an unwieldy hazard. They block ocean views, which used to be unimpeded, and significantly change the windswept, rounded contours of the original landscape. I've found the local palette of large shrubs and small trees to provide excellent windbreaks and almost year-round flowers, and to have little need for the tree surgeon. I like the local wild lilac from nearby Mt. Tamalpais with its fragrant sky-blue blossoms in early spring as a quick-growing windbreak and hedge. It reaches mature size quickly and lives for twenty years in the garden. Another favorite local hedge plant is coffeeberry, excellent for background plantings. Light-green new growth in the spring contrasts pleasantly with its mature dark-green leaves.

An excellent "nurse plant" and quick-growing windbreak is the tree mallow. This shrub has amazing recuperative power, recovering quickly from depredation by both gopher and deer. I view it as a decoy plant, since it receives the bulk of the onslaught of both these plant munchers in our garden but is usually able to recover. Growing to twelve feet tall, it has rosy-pink blossoms much of the year. Another suitable shrub is the showy island bush poppy, with yellow poppy-like flowers which contrast with its hand-



A creamy white form of the native poppy.

The author's coastal flower border.



Channel Islands potato vine.



The coastal form of the California poppy.

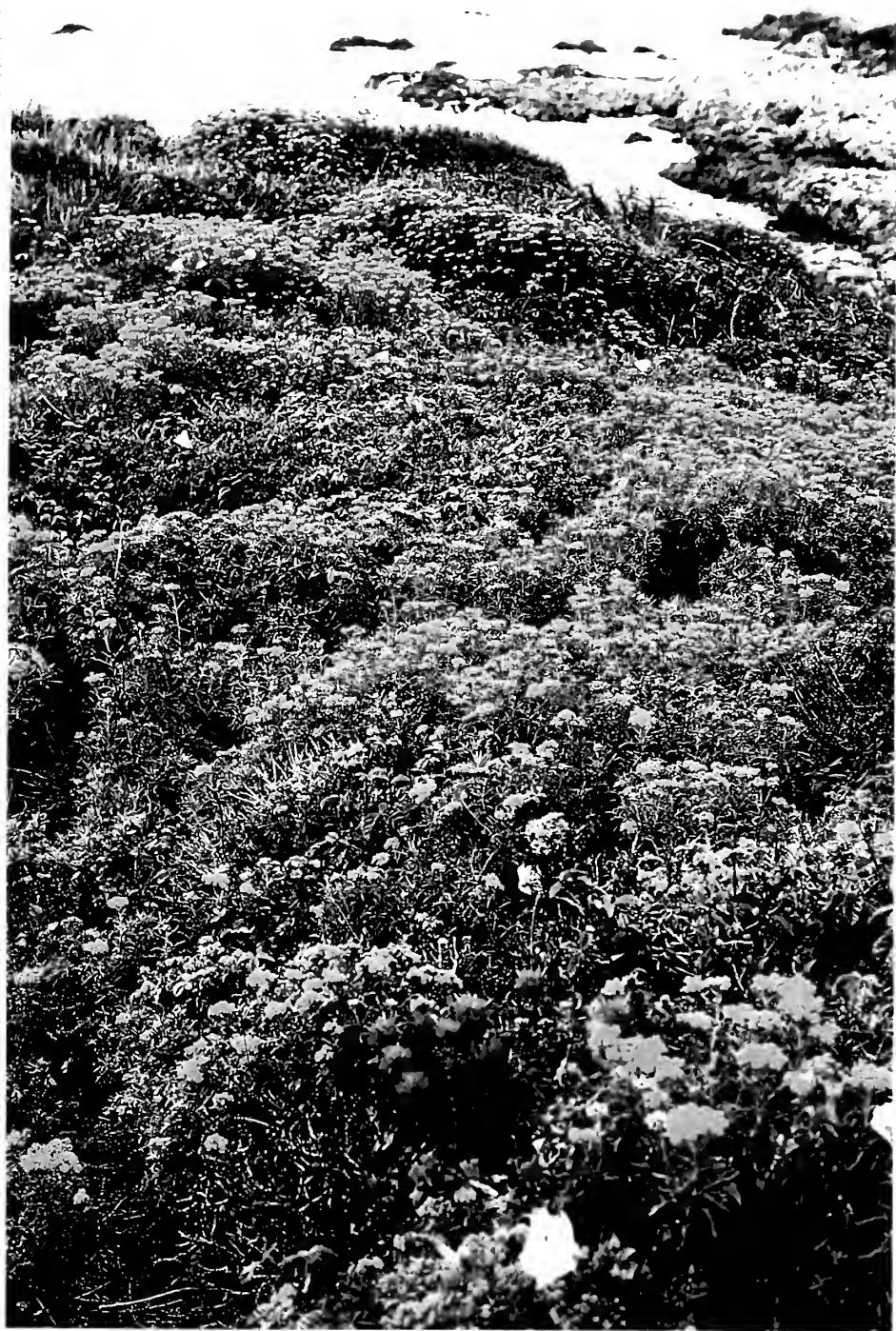
some blue-gray ovate leaves. This shrub prefers sun and good drainage and has surprised us with its quick growth. Equally vigorous is the red elderberry, a shrub with tropical-looking foliage, lush and rounded. Its creamy white blossoms in large heads are an added bonus.

In the coastal prairie section of the garden, I experiment with different combinations of grasses and wildflowers, most of which are no longer in evidence in this area — or so I originally thought. California fescue is one of the stars. I've found this fountainlike, wide-spreading, stately grass in many different environments, from a clearing in the mixed evergreen forest to a wind-blown coastal bluff, where it grew with lizard tail and coyote bush. We planted one-gallon

containers two feet apart, based on our observations from nature. However, they spread, with the modest encouragement of our mulch, to at least three feet wide. This is a grass that you don't want to see crowded, as its form is too beautiful to lose. In a mature stand in nature, the spacing is perfect.

Pacific reedgrass is a majestic grass four feet tall and equally broad. Found in damp coastal forests and on moist dunes, it seems happy in our relatively dry garden. Handsome throughout the year, it makes an excellent specimen plant.

Another promising grass is coastal hairgrass, a low-growing bunchgrass with a pin-cushion form, particularly pleasing when its inflorescences mingle with the leaf blades.



Native coastal chaparral — a dazzling, low-mounded tapestry of shrubs, herbaceous perennials and annuals kept compact and shapely by the wind.

It's a good idea to burn this grass every few years so that it retains its neat shape.

Coastal Perennials

Amidst this framework of shrubs or grasses are lower-growing perennials. One of the glories of our garden is the long-blooming coastal form of the California poppy, a small plant eight inches wide and five inches tall. I must say that it has become fairly aggressive away from its sand dune habitat. It's difficult, though, to complain about a plant with such exquisite blue-gray foliage and dazzling satiny yellow petals which blooms for five months — with no water. This plant's mound-like habit as well as the color of its flowers contrast with the upright habit and crayon-orange blooms of the more commonly grown California poppy. There are seventy different strains of the California poppy in California; this is one of the worthiest.

Another dune plant that we grow both with the native bunchgrasses and in the flower border is the sea pink. A plant that has provided many cultivars to the garden trade, it has an elegance and grace that has sometimes been lost in the shorter-stemmed, darker pink garden forms. Rising on fifteen-inch stalks from a neat grassy mound, the ball-like pale pink flowers sway with the afternoon wind. Also a pretty addition to both grassland and flower border is the coastal wallflower. Technically a biennial, this low grower has cream-colored flowers with a pleasant fragrance. In our garden, bloom lasts for several months, beginning in early spring.

In late summer when many California gardeners are watering constantly to maintain any kind of bloom, one genus provides a wide range of pleasing pinks and whites and requires no supplemental irrigation. The eriogonums, or buckwheats, include two- to three-foot tall shrubs like St. Catherine's lace and Santa Cruz Island buckwheat. Recruited from the nearby rocky sandstone bluffs are

the lower-growing eriogonums, like chalk buckwheat and its showier southern relative, rosy buckwheat. Butterflies are almost constant visitors to their pink and white flowers, held up from their silvery foliage on fifteen-inch stalks. Another butterfly favorite from the dunes is the beach aster, with a growth habit that combines well with the buckwheats and sea pinks. In August, its pale lavender, daisylike flowers are complemented by the orange-tapestried wings of the butterfly known as the West Coast Lady.

The Douglas iris is still another plant that moves happily from dune to bluff to grassland. More delicate in appearance than the bearded iris, our wild plant has a wide color range, from deep velvety purple to lavender to creamy white. Growing both in sun and part shade and in many different soils throughout the Coast Ranges of California, it spreads slowly through underground rhizomes. We use it in the windswept flower border and in the shade of an oak tree.

A Minimum of Maintenance

A native garden like this one requires little fanfare during planting and unbelievably little maintenance after that. Here on the coast fall or early winter, right before the rains start, is the best time to plant. Three or four months of weekly watering if natural rainfall is sparse is usually all that's required to establish coastal perennials when they're growing in their proper place. The rule of thumb used by most California gardeners — water even drought-tolerant natives through their first summer dry season — usually does not apply to these coastal natives planted along the foggy coast.

From the beginning, we've mulched heavily, with whatever materials we could find. We've never fertilized; the addition of mulch seems to create enough of a hospitable environment.

Our evolving natural garden has pro-

PLANTS FOR COASTAL CALIFORNIA

PERENNIALS

<i>Armeria maritima</i>	Sea pink
<i>Camissonia cheiranthifolia</i>	Beach evening primrose
<i>Erigeron glaucus</i>	Beach aster
<i>Eriogonum arborescens</i>	Santa Cruz Island buckwheat
<i>Eriogonum giganteum</i>	St. Catherine's lace
<i>Eriogonum latifolium</i>	Rosy buckwheat
<i>Eriogonum grande rubescens</i>	Rosy buckwheat
<i>Eriophyllum staechadifolium</i>	Lizard tail
<i>Erysimum concinnum</i>	Coastal wallflower
<i>Eschscholzia californica</i> var. <i>maritima</i>	Coastal California poppy
<i>Fragaria chiloensis</i>	Coastal strawberry
<i>Iris douglasiana</i>	Douglas iris
<i>Lupinus variicolor</i>	Lupine
<i>Satureja douglasii</i>	Yerba buena
<i>Scrophularia californica</i>	Bee plant
<i>Sisyrinchium bellum</i>	Blue-eyed grass

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<i>Deschampsia cespitosa</i> ssp. <i>holciformis</i>	Coastal hairgrass
<i>Festuca californica</i>	California fescue

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<i>Artemisia pycnocephala</i>	Sand hill sage
<i>Baccharis pilularis</i>	Coyote bush
<i>Ceanothus thyrsiflorus</i>	Wild lilac
<i>Dendromecon rigida</i> ssp. <i>harfordii</i>	Island bush poppy
<i>Lavatera assurgentiflora</i>	Tree mallow
<i>Mimulus aurantiacus</i>	Sticky monkeyflower
<i>Rhamnus californica</i>	Coffeeberry
<i>Ribes sanguineum</i>	Flowering currant
<i>Salvia brandegei</i>	
<i>Salvia leucophylla</i>	Purple sage
<i>Sambucus callicarpa</i>	Red elderberry
<i>Solanum wallacei</i>	Channel Islands potato vine

duced plenty of surprises. Once we cleared the weedy exotics from the site, wild volunteers began to appear, including a native perennial lupine and the coastal strawberry. The lupine reseeds freely, and the strawberry has grown into a handsome ground cover. The native perennials I brought in have replanted themselves — one of the pluses of a garden designed and planted in accordance with local natural models. The coastal poppy, beach evening primrose,

blue-eyed grass and the buckwheats have all reseeded vigorously.

From coastal chaparral to coastal prairie, you could hardly ask for an easier or more satisfying garden. It requires no supplemental water once established, no fertilizers or pesticides, just a bit of routine weeding. It is a garden to think about, to learn from and to connect you with that even more interesting garden that flourishes beyond the fence. 🌍

DESERT GARDENS

BY STEVE MARTINO



A striking garden for the Arizona desert designed by the author.

I grew up in Phoenix, in the heart of the Sonoran Desert, and I've stayed on to design gardens here. Phoenix, like most desert cities, has a deep sense of denial about its natural environment. When I first started designing landscapes in 1971, I used as much turf and exotic plants as anyone — that's what landscape architects did. The desert was viewed as a wasteland; anything you did to it was an improvement. As a child, however, nothing in the city had ever seemed as interesting as being out in the desert. This feeling resurfaced as landscape design became more and more of a passion. Ripping out desert natives and replacing them with alien plants that not only look out of place but need massive infusions of water and constant attention to stay alive came to seem shortsighted and foolish.

STEVE MARTINO, *ASLA*, a pioneer in the use of native desert plants, specializes in landscape design and ecological restoration for arid regions, particularly Arizona and Texas. The designer of the John Rhuart Demonstration Garden at Tucson's Desert Botanical Gardens, he has received more than 60 design awards.

I began to strive for gardens which evoke the special qualities of the desert. Appropriate plant selection, placement and massing, along with appropriate mulches and paving materials, can quite poetically express the ecology of the desert and its sense of place. Using native plants was also the simplest way to make a home fit comfortably into the desert environment. As a bonus, desert natives are genetically suited to the soil and rainfall of the region, so water conservation follows. Creating functional and beautiful outdoor spaces that integrate human activity with the natural processes of a site — that's what my gardens are all about.

Wildness and Order

Site research forms the foundation for all my designs. I take soil samples and have them tested at Al Lengyel's agricultural lab in Phoenix. Our central Arizona soils are alkaline, high in salts, low in organic matter and microorganisms and usually riddled with layers of calcium carbonate or caliche that you either have to work around or jackhammer to make hospitable for plants. The water here is also alkaline and high in bicar-

bonates, compounding the problem. Organic matter must be added to soils with a high pH to give the plants the best possible start in their new environment. When I do a site analysis, I also look at the “big picture” — not just the site itself but also the streetscape, the neighborhood and the region. I tailor my designs to all of these to make the gardens feel at home.

In my designs I use the “hardscape” — paving, walls, fences — to structure and define space. I like the juxtaposition of these refined and ordered man-made elements with the wildness of an ever-changing natural garden. The right kind of mulch, or what I call “desert pavement,” is crucial for a natural-looking landscape. Because rainfall is so sparse and plants must compete for water, the ground is not thickly carpeted with plants like the prairie or the eastern forests. Consequently, matching the rock types, sizes and colors of the surrounding landscape is important and requires an artistic eye.

Before I think about specific plants, I think in terms of plant forms or masses that will be needed to perform specific functions. What sculptural form or massing, for example, will provide privacy, a sense of enclosure and refuge? Where do I need to locate trees to cast cooling shade?

Exploring the Desert

When I first started using native desert plants, the landscape industry knew little about them. There was even less interest among gardeners and nurserymen. I was fortunate to meet Ron Gass early in my career. Ron is a naturalist, native plant specialist and nurseryman. I must have driven him crazy when I started hanging around his nursery. I would ask what seemed like a hundred times what each plant was. Most plants didn’t have common names, and I could never remember the Latin nomenclature.

STEVE MARTINO



The Douglas garden in Mesa, Arizona, is inspired by the character of the desert wash, where plants are dense and lush. In flower is the chuparasa or hummingbird bush.

STEVE MARTINO



In the front of the border, pink penstemons bloom. At far right is the Sonoran Desert’s most famous native plant, the saguaro cactus.

STEVE MARTINO



The author likes the bald, sculptural form of prickly pear cactus, at right. These plants also have spectacular flowers and need no supplemental water.

Ron and I became good friends and I traveled with him on several seed collecting expeditions throughout the Sonoran Desert. Several times we even ventured into northern Mexico. Ron had an intimate knowledge of desert plants. He knew the exact location and elevation where each of his nursery plants grew in the wild. He'd say something like, "I found this growing in Pepper Sauce Canyon north of Tucson in the Catalina Mountains." You can bet when I found myself hiking in that canyon ten years later, I was on the lookout for Arizona yellow bells. This kind of first-hand knowledge has made me a much more skillful and intuitive desert garden designer. However, until I developed some confidence in using these "unknown" plants, I'd show my designs to Ron and ask him what he thought about my plant combinations and whether he felt that they all fit together. Ron Gass's Mountain State wholesale nursery provided dozens of plants for my backyard designs in the early years. Today, he grows thousands of native plants for my large-scale desert restoration projects. Several of these species have no commercial market yet.

Desert Shapes and Shadow Patterns

I try to capture the character of the arroyo or desert "wash" in my garden designs. The wash is my favorite part of the desert. It's where the action is. These natural drainage ways are where the plants are dense and lush and animals come to seek shelter.

Whenever I saw a grouping of plants in nature that appealed to me I'd try to analyze what it was about them that I liked. I'd even photograph the scene for future reference. It was always the combination of texture, leaf pattern and color that made these combinations so remarkable. I especially like the effect of cactus growing out of plant masses.

Plants with bold shapes also play an integral role in my desert gardens. The relent-

less Arizona sun is a major element of desert gardening — in fact, I consider it an absolutely basic design tool. The blinding midday sun tends to flatten forms and colors. Only the strongest shapes remain distinct. The light doesn't soften and color doesn't return until late afternoon. The bold, distinctive shapes of spiked agaves (*Agave* spp.), ocotillo (*Fouquieria splendens*) and prickly pears (*Opuntia* spp.) hold their own against the brilliant midday light. They also cast wonderful shadows. Also basic to desert gardening is creating intricate shadow patterns on walls and paving — I'd go as far as to say that a tree's shadow is as important as the tree itself.

Penstemons and Prickly Pears

One of my favorite plants is the versatile mesquite tree. In fact, I use several different mesquites in either standard or multi-trunk forms — mostly the relatively small and slow-growing velvet mesquite (*Prosopis juliflora*) but also a new cultivar, *Prosopis alba* 'Colorado', developed by Mountain States nursery, which looks a lot like the popular Chilean mesquite but is more cold hardy, and the western honey mesquite (*Prosopis glandulosa* var. *torreyana*), which has the largest leaves and is the most open and airy tree. Mesquites grow from twenty to fifty feet tall, are handsome and extremely drought-tolerant and provide the most leaf area, and therefore shade, per gallon of water, according to studies by the University of Arizona. Their seed pods are a favorite food for many rock and antelope squirrels, as well as javelina. Blue palo verde (*Cercidium floridum*) is another favorite tree. This spiny deciduous tree, which grows fifteen to thirty feet high and wide, has distinctive blue-green bark and leaves and very showy yellow flowers in spring. I also like the sculptural form of prickly pear cactus, especially when contrasted with soft spreading ground covers. These plants have wonderful

flowers and require no supplemental water. I most often use the native *Opuntia engelmannii*, which has yellow, pink and red flowers, the non-native *Opuntia ficus-indica*, an upright thornless tree-forming cactus with yellow flowers and big pads (leaves) and *Opuntia violacea*, which has red-violet pads and brilliant yellow flowers.

Arizona has the greatest representation of hummingbird species in the United States, and we also have the plants to attract them. My favorites, the penstemons, are even pollinated by hummingbirds. I typically use the hot pink *Penstemon parryi*, which produces an incredible show during March and April with its multiple three-foot-high flower spikes. I also use the orange-flowered *P. superbus*, the deep red *P. eatonii* and the lavender-blue *P. spectabilis*.

The chuparosa or hummingbird bush (*Justicia californica*) with its bright red flowers, the brittle-bush (*Encelia farinosa*) with its brilliant yellow blossoms and the strongly scented, olive green creosote bush (*Larrea tridentata*) form the basis of the simple plant palettes typical of my gardens. Other favorites are the ocotillo, staghorn cactus (*Opuntia acanthocarpa*), jojoba (*Simmondsia chinensis*), wolfberry (*Lycium fremontii*), indigo bush (*Dalea bicolor* var. *argyrea*), *Viguiera deltoidea*, native verbenas *Verbena goodingii* and *V. pulchella* and desert marigold (*Baileya multiradiata*), along with *Salvia coccinea* and *Salvia greggii* from the nearby Chihuahuan Desert.

Soil conditions dictate suitable species for a particular site. I always try to match the plants to the particular soil types in which they occur naturally in the wild. Except for the cacti, virtually all the plants need supplemental water until they become established.

Year-Round Color

One of the glories of desert gardening is that it's relatively easy to design a planting that will provide vibrant color the year-round.

Cliff and Marilyn Douglas's garden is a good example. At the Douglas garden, I had the opportunity to work on a site that was undisturbed, except for a faint jeep trail. We located the house on the only bare area on the five-acre site, thus preserving the rest as natural desert. The jeep trail became the driveway, and utilities were buried underground along this alignment. The Douglas house has washes on three sides, and the garden takes its inspiration from them. Although construction damage was confined to a small area, the small wash at the front of the house was totally destroyed. Brittle-bush, chuparosa, creosote bush and bursage (*Ambrosia deltoidea*) formed the basis of the site restoration.

Today, there's always something blooming. The real show starts in February with the chuparosa and its hundreds of red-orange flowers. Then the brittle-bush begins to bloom bright yellow. The penstemons and lavender verbenas bloom in March and April, followed by the palo verde trees with their spectacular yellow blossoms. In April, Arizona yellow bells (*Tecoma stans*) and desert willows (*Chilopsis linearis*) start to flower, and continue till November. The saguaro (*Carnegiea gigantea*), the Sonoran Desert's most famous plant, and other cacti flower through July. During the summer, their fruit ripens and turns deep red. The salvias bloom throughout the year.

When I began designing desert gardens, I simply wanted my projects to visually fit in with the environment, to look as if they belonged here. As my projects began to mature, an interesting thing happened. Wildlife would find their way to them and make themselves at home. First it was the pollinators, then the predators, then their predators and so on. I had unintentionally tapped into the food chain and was creating wildlife habitats — to the universal delight of my clients. These clients would be inspired to go on to learn more about desert ecology

and become proponents for its preservation.

My garden designs make no apologies for the desert but rather pay homage to it and enhance it. A friend told me the story of how he once asked a Papago elder how he survived in the desert. His response

was, "We do not survive here, we live here. This is our home." Desert gardening celebrates this spectacular environment and makes it a home for humans as well as wildlife. It doesn't try to turn it into something else.



RICHARD MACCK

Creating intricate shadow patterns on walls and paving is a basic part of gardening in the sun-drenched Desert Southwest.

ABOVE: the real squiggly, multistemmed ocotillo and its shadow.

WHERE TO GET NATIVE PLANTS

FIVE COMMANDMENTS FOR CONSERVATION-MINDED GARDENERS

BY JANET MARINELLI

Natural areas aren't just threatened by development, pollution and invasion by exotic species. To make matters worse, many are imperiled by private and commercial plant collectors who dig up native species from the wild. This isn't an isolated problem. Cactus rustlers in the Sonoran Desert threaten the saguaro (*Carnegiea gigantea*). Illegal digging is decimating wild populations of Venus's flytrap (*Dionaea muscipula*), the insectivorous plant found in boggy areas of the Carolinas. Orchids of the eastern deciduous forests, such as the white fringeless orchid (*Platanthera integrilabia*), are threatened by overcollection. Part of the problem is that plants like the native orchids are difficult to propagate. But because in most areas the nursery

trade has not yet caught up with the upsurge of interest in natural landscaping, gardeners should be cautious when buying any native plant.

So what is the best way to acquire plants for your natural landscape? Here are five "commandments" to guide native gardeners:



THOU SHALT NOT take a plant from the wild. It may be tempting to rationalize that taking "just this one plant" couldn't possibly make a difference. But it's almost never just one gardener or one plant. The cumulative impact of many trowels can be considerable. There is one exception to this rule — rescuing plants that would otherwise face certain obliteration by a shopping mall, suburban subdivision or other development. Collecting small amounts of seed to germinate yourself gen-

JANET MARINELLI *edits* BBG's *Plants & Gardens handbooks* and *is the author of* *The Naturally Elegant Home*, which will be published by Little, Brown in September.

erally does not endanger healthy plant populations.

II

THOU SHALT make a point of educating yourself about the propagation and cultivation requirements of the native plants you're thinking of putting in your garden. Too many of the native species sold at garden centers and by mail-order suppliers have been dug up from the wild. Plants that are difficult to propagate or slow to flower or reach marketable size are the most likely to have been collected from their native habitat and therefore most at risk. Trilliums, which typically take five years or more to go from seed to flower, are the classic examples. Until nursery production of such species becomes profitable, don't buy them. Admire them in the wild instead.

III

THOU SHALT design your garden using only species that are easily propagated. Plants like rudbeckias and cardinal flower (*Lobelia cardinalis*) which are easy to propagate and quick to mature have most likely been propagated commercially.

IV

THOU SHALT buy native species only from sources who state explicitly that their plants are nursery propagated. If they don't volunteer the information, ask. Don't be misled by ambiguous phrases like "nursery

grown" or "field grown," which may mean that the plant was dug from the wild and grown at the nursery for a day or a week. The words to look for are nursery propagated. Your persistence will pay off: Nursery-propagated plants are generally healthier and better looking than those taken from the wild.

V

THOU SHALT make every attempt to use plants propagated from wild populations growing within 50 miles of your garden. Botanists are also concerned that the genetic integrity of local plant communities is compromised by the introduction of the same species from other regions. While local plants have adapted for thousands of years to the precise conditions of your area, plants of the same species from other areas have no doubt adapted to different conditions. Not just genetic integrity is at stake: Non-local plants may not perform as well in your garden as true natives.

The following organizations can provide you with helpful lists of nurseries selling propagated native plants: New England Wildflower Society, Garden in the Woods, 180 Hemenway Road, Framingham, MA 01701-2699, (617) 237-4924, publishes a regularly updated booklet called *Sources of Propagated Native Plants and Wildflowers* which includes species native to zones 4, 5 and 6. For a list of nurseries offering propagated Southeastern natives, send a stamped, self-addressed envelope to the North Carolina Botanic Garden, UNC-CH, CB 3375 Totten Center, Chapel Hill, NC 27599-3375. A list of nurseries in the West is available from the Native Plant Society of New Mexico, P.O. Box 5917, Santa Fe, NM 87502. It's also worth checking with the native plant society in your own state as well as botanical gardens in your area. 🌍



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MICHAEL ANISFELD



A wooden bench invites strollers to sit and enjoy a bur oak savanna designed by P. Clifford Miller.

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FRONT COVER AND BACK COVER:

PHOTOGRAPHY BY KEN DRUSE



Even if you till a few feet of backyard or a cluster of containers on a rooftop, balcony, patio or deck, you can still have a garden that is lush and colorful.

FOREWORD

So you don't have a three-acre homestead off a winding country road. There's no need to apologize. You can still hold your head high among fellow gardeners even if you till a few feet of backyard, or a cluster of containers on a rooftop, balcony, patio or deck. That's really the only space you need to grow stately flowers like phlox, willow vines like clematis, delectable herbs or vegetables, and even a small flowering shrub to greet each season in a different garb.

I've discovered that it's simply not true that "real" gardeners are found only on expansive rural acres or large suburban sites. In recent years, more and more of us hopeful folk are thrusting our trowels into smaller and smaller plots — not only in cities, but in retirement communities and condominium apartments that have sprung up at the edge of town.

Since too few books and articles are written specifically for us, we are often con-

signed to useless scraps of information — or worse, proclamations that are misleading or just plain wrong.

This handbook, however, planned specifically with town and city gardeners in mind, shows there's no need for small gardens to be either barren or boring.

Here you will find an encouraging introduction not only to the range of superb flowers, herbs and veggies that are possible, but a sampling of rock garden plants, topiary and small weeping trees that are useful, too. Here also are suggestions for coping with shade or drought, creating a mini-meadow, sculpting a polite hedge screen, improving a front door or windowsill and adding a touch of architectural style.

I refuse to allow my own minimal space to dampen my enthusiasm for making a garden. And neither should you.

LINDA YANG
GUEST EDITOR



In the city garden as well as the country garden, the key to success is choosing plants and a style that fit your conditions.

FINDING A WAY THROUGH SHADE

BY KEN DRUSE

Town and city gardeners have to put up with a lot. There's pollution, soot, traffic and neighborhood noise. The most common lament, however, is a lack of light. "What can I grow in the dark," they ask? No ornamental plants that I know. But what is this "darkness": Is it shade cast by a neighboring tree; one or two hours of sunshine

before buildings block the light; or sunless bright light from above? A shaded city garden open to the sky may actually receive more light than a country space blackened by a canopy of tree leaves. You might think that compiling a list of shade-tolerant plants would be the first order, but in city or town gardens where space is limited, the "program" is paramount.



The many shades of green are the foundation of the shady garden. Here, Japanese painted fern, *Aquilegia* and *Rodgersia* combine strikingly.



KEN DRUSE

The lack of sun in many city gardens presents the opportunity for a woodlandlike setting with shrubs and wildflowers of the forest understory.

The program is the first thing landscape designers and architects address — the particular needs of the people who will use the space. What are you going to do in the garden? Will there be a space for outdoor entertaining, cooking or eating; a spot for relaxing; or a sandbox and swing set? If you are a sun worshipper, you'll want to locate your patio where the sunlight falls. Entertaining spots are usually closest to the house. If you are a plant collector, as I am, the elements must fit in and around the program's primary directive — spaces to grow plants.

Few "cities" are born these days (new townhouse developments notwithstanding), so you probably will have inherited a plot with some landscape history. Look at your location. What grows there? Behind my 1873 Brooklyn brownstone, I found several rose-of-Sharon, two old hydrangeas, a few hostas, self-sown petunias reverted to the magenta of their unhybridized ancestors, roadside daylilies and plenty of New York asters — what most people would call "nothing." I had to start over — my new/old backyard might as well have been wilderness. For my program, I wanted: a waterfall and pool spanned by a footbridge, a raised area for seating, an arch on which to grow vines, a patio for entertaining with a meandering path to a raised area for casual seating, and generous planting beds to grow the myriad plants I yearned for. The one thing I didn't want was the mature maple growing in my neighbor's yard just to the south, which plunges my garden into darkness through much of the growing season. I plotted and planned and plotted the garden's design, making numerous drawings to scale.

After you have made a list of the things you would like to do in your garden, determine how much or how little light you have for plants. The amount of light that reaches the garden will change every day of the year. Some city gardens that receive no



Town gardens are most striking when they blend formal elements such as this brick archway with informal plantings.



Hosta species and cultivars and a variegated *Euonymus fortunei* tolerate shade and add contrasting leaf texture to the garden.

sunlight at all in winter may bask in six or seven hours of direct sunshine in June when the sun is almost directly above. South-facing gardens have the most sunlight, with west-, east- and north-facing gardens receiving less and less. East and west gardens have the same number of hours of sun; however, west allows for more sun-loving plants than east because the heat of the afternoon has an effect on growing plants that seems to be a bit like more sun. But eastern exposure can be kinder to plants. Just ask southern gardeners who find that their best gardens are cool shade gardens. One look at a hosta gasping for moisture

lets you know what happens to a shade plant that is sheltered until 2 p.m. when laserlike sunlight hits the leaves.

Catalogs often recommend plants for partial shade. That is considered about six hours of direct sunlight — not what most of us imagine as shade. However, if you think of the daylight hours of summer as being fourteen hours long or more, you can see how this is considerably less sun than “full sun.” From partial shade’s four to six hours, there is less and less light until we come to what might be called deep shade: no sun at all, and very little light, perhaps against a north-facing wall in a



Lavender hosta blossoms blend with a mass of impatiens in this handsome shade garden.

shaded garden, or under steps or stairs. Between these extremes, there might be what we call simply "shade." There is little sun but often bright light from above or reflected sunlight from nearby walls.

You may be able to adjust the light conditions to some extent. If a neighbor's tree limbs spread over your garden, you are allowed by law to remove any or all overhanging branches. Or, if there is a venerable oak in your backyard, for example, remove the lower branches to let in more light. You can also enhance the available light by painting walls white or a light color, and by strategically placing mirrors

around the garden. I have one mirror sealed in an arch-shaped frame that fools visitors into thinking it is an opening into another garden space. Its purpose is to reflect light to a lilac and encourage a few flowers from this sun-lover.

To achieve success choose plants and a garden style that fit your conditions. But in our case, the soil *should* be based on nature's. Shaded soil is moist and airy — filled with organic matter. The plants living there have wide-spreading roots that run freely through the open medium. The soil has been enriched over time with yearly falling leaves. A good medium would con-

PLANTS FOR SHADE

<i>Acanthus mollis</i>	Bear's-breech
<i>A. spinosus spinosissimus</i>	Bear's-breech
<i>Actaea pachypoda</i>	Baneberry*
<i>Adenophora confusa</i>	Ladybells
<i>Adiantum pedatum</i>	Maidenhair fern*
<i>Adonis</i> spp.	Adonis
<i>Ajuga reptans</i>	Bugleweed*
<i>Anaphalis triplinervis</i>	Pearly everlasting
<i>Anemone</i> spp.	Windflower, anemone
(woodland species and summer-blooming hybrids)	
<i>Angelica archangelica</i>	Wild parsnip
<i>Arisaema</i> spp.	Jack-in-the-pulpit*
<i>Arum italicum</i>	Arum
<i>Astilbe</i> spp. and hybrids	False spiraea
<i>Athyrium nipponicum</i> 'Pictum'	Japanese painted fern*
<i>Begonia grandis</i> ssp. <i>evansiana</i>	Hardy begonia
<i>B. semperflorens</i>	Fibrous begonia
<i>Bergenia cordifolia</i>	Bergenia
<i>Chelone lyonii</i>	Turtlehead
<i>Cimicifuga</i> spp.	Bugbane
<i>Corydalis lutea</i>	Yellow fumatory*
<i>Cyclamen</i> spp.	Hardy cyclamen*
<i>Deparia acrostichoides</i>	Silvery glade fern
<i>Dodecatheon</i> spp.	Shooting star
<i>Dryopteris filix-mas</i>	Male fern
<i>Filipendula</i> spp.	Meadowsweet

tain one part garden soil or even clayey loam, one part sand, and one to two parts humus in the form of leaf mold, compost, thoroughly rotted cow manure or sphagnum peat moss. This mixture will be somewhat acidic, but most plants of the shade like it that way. Cover surfaces with mulch.

The woodland plants need this highly moisture-retentive medium that is also very well draining. For efficiency and convenience, also plan for automated irrigation in the planting beds. Consider installing soaker hoses buried within every new bed you make.

For many of us gardeners, shade equals a woodlandlike setting and forest-understory plants. On the other hand, location and scale influence choices as well. Town gardens are often most successful when they have a formal design with paved areas, paths and symmetrical beds that utilize space effectively. This apparent dichotomy can be an exciting design challenge or daunting. Try to blend the formal with the informal. You might make a rectangular reflecting pool to capture the light and bring it down to the garden. Or, perhaps,

<i>Galax urceolata</i>	Galax*
x <i>Heucherella</i>	Heucherella
<i>Hosta</i> spp. and hybrids	Hosta, plantain lily*
<i>Houttuynia cordata</i>	Houttuynia (Zone 6-10)
<i>Hylomecon japonicum</i>	Hylomecon
<i>Impatiens walleriana</i>	Impatiens, busy-lizzy (tender perennial)
<i>Lamium galeobdolon</i>	'Herman's Pride', yellow archangel
<i>Ligularia</i> spp.	Ligularia
<i>Liriope</i> spp.	Lily turf*
<i>Lobelia cardinalis</i>	Cardinal flower
<i>Lysimachia nummularia</i>	Creeping jenny
<i>Macleaya cordata</i>	Plume poppy
<i>Maianthemum canadense</i>	False lily-of-the-valley
<i>Osmunda regalis</i>	Royal fern
<i>Ophiopogon</i> spp.	Mondo grass*
<i>Phlox stolonifera</i>	Creeping phlox
<i>Polemonium</i> spp.	Jacob's ladder
<i>Polygonatum</i> spp.	Solomon's seal
<i>Polystichum acrostichoides</i>	Christmas fern
<i>Primula japonica</i>	Japanese primrose
<i>Pulmonaria</i> spp.	Lungwort
<i>Sanguinaria canadensis</i>	Bloodroot
<i>Saxifraga</i> spp.	Saxifrage, strawberry begonia
<i>Smilacina racemosa</i>	False Solomon's seal
<i>Stylophorum diphyllum</i>	Celandine poppy*
<i>Tellima grandiflora</i>	False alumroot
<i>Thalictrum aquilegifolium</i>	Meadow rue
<i>Trachystemon orientalis</i>	Trachystemon
<i>Trollius</i> spp.	Globeflower
<i>Uvularia grandiflora</i>	Great merrybells, bellwort*

create organized beds filled with shade-tolerant woodlanders, edged not by carefully trimmed sun-loving herbs, but by clipped Japanese holly (*Ilex crenata*) or a curb of granite blocks or bricks. The formal garden in the shade could have flowering annuals in its symmetrical beds. The back of the yard and areas for screening along the sides could be home to more naturalistic plantings.

These informal arrangements can be blendings of shrubs and herbaceous perennials such as ferns and hostas, along with

native woodlanders. Learn from the model of the forest's tri-leveled hierarchy. Above is the tree-top canopy, which for you might be buildings or your single ornamental tree. The flowering forest understory of shrubs is similar to your garden's layer of woody, shade-tolerant plants. Around these plants that help define the structure or "bones" of the garden, are the next-lower plants, the herbaceous perennials.

Wildflowers will grow along with the cultivated herbaceous species, woody plants and bulbs. Native plants often do

SHADE-TOLERANT SHRUBS

<i>Abelia x grandiflora</i>	Glossy abelia (semievergreen)
<i>Acer palmatum</i>	Cut leaf maple*
<i>Aralia elata</i>	Devil's walking stick, angelica tree
<i>Aucuba japonica</i>	Aucuba*
<i>Azalea</i>	see Rhododendron
<i>Berberis</i> spp.	Barberry species
<i>Calycanthus floridus</i>	Sweetshrub*
<i>Camellia japonica</i>	Camellia
<i>Cephalotaxus</i> spp.	Plum-yew
<i>Clethra alnifolia</i>	Sweet pepperbush
<i>Cornus alba</i> (C. <i>alba</i> 'Sibirica')	Red-twig dogwood, Tartarian dogwood
<i>Corylopsis</i> spp.	Winter hazel
<i>Daphne x burkwoodii</i>	Burkwood daphne
<i>Enkianthus campanulatus</i>	Enkianthus
<i>Euonymus japonicus</i>	Japanese euonymus
<i>E. fortunei radicans</i>	Wintercreeper*
<i>x Fatshedera lizei</i>	Tree-ivy
<i>Fatsia japonica</i>	Japanese fatsia
<i>Fothergilla major</i>	Large fothergilla
<i>Gaultheria forestii</i>	Gaultheria
<i>Hamamelis mollis</i>	Chinese witch-hazel
<i>H. virginiana</i>	American witch-hazel
<i>Hibiscus syriacus</i>	Rose-of-Sharon

well because they come from similar locations. The forest floor features a plethora of wildflowers blooming in spring above a blanket of rich-brown mulch (leaves in nature). Select natural-looking organic mulches such as chopped leaves, licorice root, buckwheat hulls or shredded fir bark — avoid large-scale bark chips or quarried gravel. In a small area, more has to be packed into less space, so consider living “mulches” — the ground covers. Ground covers underplanting our horticultural assemblage provide additional chances to collect and grow brilliant miniature specimens, such as false lily-of-the-valley (*Maianthemum canadense*).

The tried-and-true covers for shade may not be as unfamiliar, but are dependable

and nearly indestructible. Ivy (*Hedera helix* and many of its cultivars), *Vinca minor* and pachysandra are the top three. Mention pachysandra to most people and they think, “shiny, plastic, pea-green” — the cover that seems over-used throughout suburban America. There are reasons this Japanese plant is so widely planted. It is easy to grow, adaptable to dense shade and has very low maintenance requirements since it smothers nearly all weeds once it becomes established. There are also new varieties coming along that have interesting serrated and even oak-shaped leaves, and there is a variegated cultivar which, unfortunately, does not spread as rapidly, and the magnificent native species. Although it is also slow-growing, Allegheny


<i>Hydrangea arborescens</i> 'Annabelle'	Tree hydrangea, smooth hydrangea
<i>H. aspera</i>	Rough-leaved hydrangea*
<i>H. quercifolia</i>	Oak-leaved hydrangea*
<i>Ilex</i> spp.	Holly
<i>Itea virginica</i>	Virginia sweetspire
<i>Kalmia latifolia</i>	Mountain laurel
<i>Kerria japonica</i>	Kerria
<i>Leucothoe fontanesiana</i>	Drooping leucothoe
<i>Ligustrum</i> spp.	Privet
<i>Magnolia tomentosa</i> (<i>M. stellata</i>)	Star magnolia
<i>Mahonia japonica</i>	Mahonia
<i>Osmanthus</i> spp.	Tea olive, osmanthus
<i>Pieris</i> spp.	Andromeda
<i>Pittosporum</i> spp.	Pittosporum
<i>Rhododendron</i> spp.	Rhododendron, rosebay
<i>Rhus</i> spp.	Sumac
<i>Salix</i> spp.	Shrub willows
<i>Sarcococca</i> spp.	Sarcococca, sweet box
<i>Skimmia japonica</i>	Japanese skimmia*
<i>Symphoricarpos albus</i>	Snowberry
<i>Taxus</i> spp.	Yew*
<i>Viburnum</i> spp.	Viburnum
<i>Xanthorrhiza simplicissima</i>	Yellow root

*Tolerates low light in my garden

spurge (*Pachysandra procumbens*), has beautiful mottled leaves in spring that become solid, matte green by summer. And none of these plants needs to be mowed.

Lawn is not a good choice. Grass needs sun, and even if you have enough light, no living ground cover can take the constant traffic of limited space in the small city garden. Many people insist on lawn, if only to gaze upon, but remember, this tiny swath will have to be mowed, too, and the mower will have to be stored. It may not be worth the trouble to have a green patch that might best be clipped with cuticle scissors. Hard-surface paving materials are best in high-traffic areas, and require less maintenance — only occasional sweeping or hosing.

The list of shade plants is potentially enormous. Open your eyes and mind, see all you can and experiment. You will no doubt try hybrid tea roses once or twice and watch them languish — and finally die, spindly cane by cane. But then one of the tenets of our favorite pastime is "if at first you don't succeed, you're bound to be a gardener."

All of these plants enjoy a bit of sun; however some, especially the woodland wildflowers, will thrive as long as there is bright light. The taller herbaceous perennials that bloom in summer do want as much sun as the shade gardener has — in any event, they will probably require staking to stand tall in the sheltered garden. You may just allow them to flop on top of their neighbors, as I often do. 

COLOR ME QUICK

BY TED MARSTON

TED MARSTON



The French have a phrase for it, "Le sauce c'est tout." When you're cooking up a garden, the annuals are the spice, the sauce, the color. They're the frosting on the cake, the extra zest that makes a lived-in garden come alive. And they're ever so speedy.

This need for quick color is intensified in small town and city spaces where there's no room for grand herbaceous borders. Flower color from trees and shrubs can be dramatic, but their limited number makes them an exuberant splash for only a short time.

In most American climates, annuals provide bright colors and contrasts in textures from early spring through late autumn. And lucky are those in the favored places where color from annuals is enjoyed year-round.

Strictly speaking, annuals are plants which sprout, bloom, set seed and die all in the same year (leaving their progeny to carry on the race next year). But in the small garden, it's best to think of annuals as color spots interwoven in the backbone of the garden for enjoyment this year, and then replanted again the next. This gives you the freedom to use any plant or plant combination for seasonal color.

And actually, many plants we traditionally think of as annuals (such as petunias, snapdragons and bedding geraniums) are really tender perennials, which means they are not winter hardy in most gardens. Biennials, too, which make clumps of leaves the first season, then bloom the second, can be treated as annuals and planted out the spring of the year they bloom.



A barrel overflowing with pink petunias, ivy geraniums, lobelia and other flowers can provide a splash of color in even the tiniest garden.

Such free-spirited thinking widens your plant selection immensely. Many tropical foliage plants, for example, lend golds, purples and bronzes and white-marked green leaves to the summer color scheme. Cordylines are used so often to anchor a tub of geraniums, some think they've become a cliché. But there are a host of others which also grow vigorously in hot weather such as Swedish ivy or its smaller-leaved, variegated or purple cousins. There's the royal purple of *Setcreasea purpurea*, or the striped leaves of Moses-in-a-Boat (*Rhoeo spathacea*). Dramatically colored foliage plants are perhaps most effective massed in strips or ribbons but can be equally appealing with flowering plants in a mixed container planting.

Tender sub-shrubs such as silvery *Helichrysum petiolatum* and 'Limelight', its

TED MARSTON



A lushly planted hanging basket enlivens a wooden fence.

ANNUALS FOR BRIGHT SHADE

- Impatiens (*Impatiens walleriana*) — 'Accent Hybrids', 'Super Elfin Hybrids', 'Tempo Hybrids'
- Tuberous begonia (*Begonia tuberhybrida*) — 'Non-Stop Hybrids', 'Clips Hybrids'
- Fibrous begonia (*Begonia semperflorens*) — 'Cocktail Hybrids', 'Varsity Hybrids', 'Prelude Hybrids'
- Nicotiana (*Nicotiana glauca*) — 'Domino Hybrids', 'Nicki Hybrids'
- Browallia (*Browallia speciosa*) — 'Bells Hybrids'
- Ageratum (*Ageratum houstonianum*) — 'Blue Danube', 'Hawaii'
- Coleus (*Coleus x hybridus*) — 'Wizard Hybrids', 'Poncho Hybrids', 'Fiji Hybrids'
- Dusty miller (*Senecio bicolor cineraria*) — 'Silver Dust' and 'Silver Lace'
- Forget-me-not — (*Myosotis sylvatica*)
- Fuchsia (*Fuchsia hybrida*) — 'Swingtime', 'Lena', 'Indian Maid', 'Gartenmeister Bonstedt'
- Lobelia (*Lobelia erinus*) — 'Color Cascade Hybrids', 'Cambridge Blue', 'Crystal Palace', 'Sapphire'
- Salvia splendens* — 'Carabiniere Hybrids', 'Laser Hybrids'
- Salvia farinacea* — 'Victoria'
- Sweet alyssum (*Lobularia maritima*) — 'Wonderland Hybrids'

In addition to coleus, a variety of other foliage plants will work well in the shade, including English ivy (*Hedera helix*), *Plectranthus* species and variegated ground ivy (*Glechoma hederacea variegata*). Keep in mind, however, that ground ivy is invasive; use it in containers only.

ANNUALS FOR SUN

- Geranium — Zonal geranium (*Pelargonium x hortorum*)
Cutting: 'Tango', 'Forever Yours', 'Blue', 'Snowmass'
Seed: 'Orbit Hybrids', 'Ringo Hybrids', 'Elite Hybrids'
- Ivy geranium (*Pelargonium peltatum*) — Cascade series: 'Galilee', 'Salmon Queen', 'Beauty of Eastbourne'
- Petunia (*Petunia* hybrids) — 'Ultra Hybrids', 'Super Cascade Hybrids', 'Falcon Hybrids', 'Madness Hybrids', 'Celebrity Hybrids', 'Carpet Hybrids'
- French marigold — (*Tagetes patula*) 'Aurora Hybrids', 'Boy Hybrids', 'Bonanza Hybrids', 'Hero Hybrids', 'Disco Hybrids'
- Aztec marigold (*Tagetes erecta*) — 'Inca Hybrids', 'Perfection Hybrids', 'Voyager Hybrids' and 'Discovery Hybrids'
- Fibrous begonia (*Begonia semperflorens*) — 'Prelude Hybrids', 'Varsity Hybrids'
- Pansy (*Viola x wittrockiana*) — 'Crystal Bowl Hybrids', 'Universal Hybrids', 'Maxim Hybrids'
- Periwinkle (*Catharanthus roseus*) — 'Pretty Hybrids', 'Magic Carpet Hybrids'
- Sweet alyssum (*Lobularia maritima*) — 'Wonderland Hybrids'
- Salvia* (*Salvia farinacea*) — 'Victoria'; (*Salvia splendens*) — 'Carabiniere Hybrids', 'Laser Purple'
- Dusty miller (*Senecio bicolor cineraria*) — 'Silver Dust' and 'Silver Lace'
- Dianthus (*Dianthus chinensis*) — 'Teistar Hybrids', 'Princess Hybrids'



A terrace provides a perfect setting for a collection of plants in pots, including snapdragons, coleus and a rhododendron.

chartreuse-leaved form, add immense character to the garden as they weave their way through other plants. And ornamental grasses (many of them annual) rustle seductively in summer breezes and are topped by distinctive seed heads in fall that remain decorative all winter.

Good garden centers and nurseries abound with ideas for plants to color your garden. And some, like the ivies, with unusual lobed or feathered leaves or patterns of golds and white are not even found in the annuals section. There are also a wealth of annuals not even found in garden centers. Some are easy and colorful but have difficult names like *Nolana*, *Venidium* and *Dimorphotheca*. These are the plants you have to

PLANTS FOR FALL & WINTER

Pansy (*Viola x wittrockiana*) — 'Universal Hybrids', 'Crystal Bowl Hybrids', 'Maxim Hybrids'

Chrysanthemums (most are not reliably winter hardy)

Ornamental kale & cabbage (*Brassica oleracea*) — 'Dynasty', 'Chidori', 'Peacock'

Primrose (*Primula vulgaris*) — 'Festive Hybrids', 'Ducat Hybrids', 'Julian Hybrids'

FOLIAGE PLANTS FOR SUN

Castor bean (*Ricinus communis*) —
'Impala', 'Carmencita'

Alternanthera species

Blood leaf (*Iresine herbstii*)

Basil (*Ocimum basilicum*) — 'Purple
Ruffles', 'Green Ruffles', 'Spicy
Globe'

Asparagus fern (*Asparagus sprengeri*)
(*Asparagus densiflorus* 'Myers')

Perilla (*Perilla frutescens*) — 'Crispa'

Snow-in-summer (*Euphorbia marginata*) — 'White Top', 'Summer Icicle'

start yourself from seeds purchased by mail.

While many annuals perform brilliantly from direct seeding in the garden, (*Cosmos* and *Cleome*, for example), others must be started early indoors. Many fine plants can also be started from cuttings: daisies such as marguerites (*Chrysanthemum frutescens*), for example, or *Verbena* 'Silver Anne' and 'Sissinghurst'.

But it's no secret that much of the action in annuals is at garden centers. There customers find instant color, and various sized plants in small cell packs, six-inch pots and sometimes even larger sizes.

Although some town and city gardens aren't blessed with as much sunlight as their owners would like, a few annuals will give respectable flower display with minimal sun so long as there's bright reflected light to trigger bloom. As the hours of sunlight expand, so too will your choice of plants. And this includes varieties which revel in full sun, as well as those that can thrive in reflected heat from south- or west-facing buildings.

If you're uncertain about the fertility of your soil but don't want to take time to feed

OLD FAVORITES

Bachelor's button (*Centaurea cyanus*) —
'Boy Hybrids', 'Jubilee Gem'

Baby's breath (*Gypsophila elegans*) —
'Covent Garden'

Bells-of-Ireland (*Molucella laevis*)

Calliopsis (*Coreopsis tinctoria*) — 'Tiger
Flower Improved'

Canna species

Spider flower (*Cleome hassleriana*) —
'Helen Campbell', 'Rose Queen',
'Ruby Queen'

Foxglove (*Digitalis purpurea*) — 'Foxy',
'Excelsior Hybrids', 'Apricot'

Four o'clock (*Mirabilis jalapa*) — 'Jing-
gles Hybrids'

Fuchsia x hybrida — Many varieties

Heliotrope (*Heliotropium arborescens*) —
'Marine'

Larkspur (*Consolida ambigua*) — 'Giant
Imperial Hybrids'

Love-in-a-mist (*Nigella damascena*) —
'Persian Jewels', 'Miss Jekyll'

Pot marigold (*Calendula officinalis*) —
'Bon Bon Hybrids', 'Fiesta Gitana
Hybrids'

regularly, simply add a slow-release fertilizer to your ground beds and containers before planting. Regular watering is also a must for shallow-rooted annuals in ground beds, and even more critical for container plantings.

When space is at a premium, tidiness is next to godliness. Many annuals, such as impatiens, are naturally self-cleaning, since the spent flowers just drop away. Others, such as geraniums grown from seed, must have their spent flower heads removed. Shear back petunias when they grow long and straggly and you'll have copious bloom

SHOULD BE GROWN MORE

Morning glory (*Ipomoea nil*, *I. purpurea*, *I. tricolor*) — 'Heavenly Blue Improved', 'Pearly Gates'

Nasturtium (*Tropaeolum majus*) — 'Dwarf Double Jewel', 'Double Gleam Hybrids'

Moss rose (*Portulaca grandiflora*) — 'Sundance Hybrids', 'Sundial Hybrids'

Snapdragon (*Antirrhinum majus*) — 'Rocket Hybrids', 'Princess Hybrids', 'Floral Carpet Hybrids'

Sweet Pea (*Lathyrus odoratus*) — many varieties

Verbena (*Verbena x hybrida*) — 'Romance Hybrids', 'Springtime Hybrids'

Zinnia (*Zinnia elegans*) — 'Zenith Hybrids', 'Peter Pan Hybrids', 'Border Beauty Hybrids'

Hollyhock (*Alcea rosea*) — 'Powderpuff Hybrids', 'Majorette Hybrids', 'Summer Carnival'

Cosmos (*Cosmos bipinnatus*) — 'Sensation', 'Seashells'

(*Cosmos sulphureus*) — 'Sunny Hybrids'

Globe amaranth (*Gomphrena globosa*) — 'Buddy', 'Strawberry Fields'

Blue marguerite (*Felicia amelloides*)

Chilean bell flower (*Nolana paradoxa*) — 'Blue Bird'

Corn cockle (*Agrostemma githago*) — 'Milas Cerise'

African daisy (*Arctotis stoechadifolia*)

Dahlberg daisy (*Dyssodia tenuiloba*)

Swan River daisy (*Brachycome iberidifolia*) — Splendor series

Gazania (*Gazania rigens*) — 'Daybreak Hybrids', 'Chansonette Hybrids'

Godetia (*Clarkia amoena*) — 'Grace Hybrids'

Prairie gentian (*Eustoma grandiflorum*) — 'Yodel Hybrids', 'Lion Hybrids'

Cape marigold (*Dimorphotheca* hybrids) — 'Starshine', 'Tetra Pole Star'

Melampodium (*Melampodium paludosum*) — 'Medallion'

Monkey flower (*Mimulus hybridus*) — 'Calypso Hybrids', 'Malibu Hybrids'

Nemesia (*Nemesia strumosa*) — 'Carnival Hybrids', 'Tapestry'

Nierembergia (*Nierembergia hippomanica violacea*) — 'Purple Robe'

Iceland poppy (*Papaver nudicaule*) — 'Wonderland Hybrids', 'Oregon Rainbows'

Primrose (*Primula vulgaris*) — 'Festive', 'Pacific Giant'


Butterfly flower (*Schizanthus x wisetonensis*)

African daisy (*Arctotis fastuosa*) — 'Zulu Prince'

Wallflower (*Cheiranthus cheiri*) — 'Blood Red', 'Cloth of Gold'

on compact plants again.

The hues you choose for planting should be your favorites. Consider the purity of white in the garden as a leavener of stronger colors, and for its nighttime ambience as it sparkles in the lights of a deck or terrace. Remember, too, that dark flowers recede, while bright flowers intrude. And several plants of one color are usually better than a variety of annuals of many different hues.

But don't let your head be turned only by flower color. Remember to look too at the plant's foliage textures. 

PERENNIALS FOR TOWN & CITY GARDENS

BY RUTH ROGERS CLAUSEN
&
NICOLAS H. EKSTROM

Town and city gardens, small by definition, are intimate spaces important in relieving the harshness of the urban landscape. Their limited size is far outweighed by the extent to which they improve the quality of life.

While smallness of space may be an advantage in terms of labor, it presents certain inherent problems in garden design. Privacy is a critical factor due to the closeness of neighbors, but trees and shrubs, hedges and even fences can supply necessary screening, while making an ideal setting for smaller plants and perennials. Background plantings, as well as attention to scale in the selection of perennials, can provide an illusion of space.

In small town and city gardens, which are enjoyed throughout the year, shrubs are often combined with perennials to furnish off-season interest. Some perennials, regrettably few in number, retain their foliage throughout the winter; some of our

favorites in our New York gardens include variegated lily-turf (*Liriope muscari* 'Variegata'), many of the coral bells (*Heuchera*), European ginger (*Asarum europaeum*), strawberry begonia (*Saxifraga stolonifera*) and evergreen ferns such as Christmas fern (*Polystichum acrostichoides*). The dry foliage and elegant fruiting heads of ornamental grasses also remain attractive for most of the winter months.

Less costly than shrubs, more permanent than annuals, perennials cover a broad and varied range. Even the novice can achieve a sophisticated complexity of design by using a variety of these plants.

The choice of flower color is a personal one, but it's well to remember that cool colors such as blues and whites create an illusion of distance, whereas strong hot colors create the opposite effect.

The season of bloom for most perennials is fleeting, so it is particularly important in a small garden to select plants with what



Astilbe, left center, and yarrow, lower right, are among the perennials recommended for city gardens.

is known as "good foliage." This term implies not only that the leaves are durable, but that the plant has an attractive habit as well as foliage that is interesting in shape, texture or color.

Certain practical problems are associated with urban gardening. There is shade, for example, which not only limits the selection of usable plants, but from a design standpoint must be brightened with white or light-colored flowers or variegated foliage. Unfortunately, few silver- and gray-leaved plants thrive in minimal sunlight.

Due to the proximity of buildings and other structures, an urban garden may suffer from poor drainage. The soil may be compacted from heavy use and is frequently exhausted since organic materials are not naturally renewed each year. So amending and fertilizing the soil is of prime importance. Raised beds, as well as containers, may be employed so that the qual-

ity of the soil can be readily controlled. Moreover, raised beds create a variation in height, providing interest in limited spaces.

The plants in town and city gardens must be chosen for tolerance of both pollution and the heat retained by the hardscape.

In confined spaces, pest and disease problems are aggravated, and it is important to control them quickly, since the damage is especially noticeable close up.

The following short list of perennials includes many that we grow in our own gardens. We have chosen them with availability and ease of culture in mind.

The following abbreviations are used in the plant list: SP=spring, SU=summer, F=fall, E=early and L=late. The letters H and T following the zones of hardiness indicate, respectively, the sensitivity to or tolerance of combined heat and humidity in our hottest zones.

PERENNIALS FOR TOWN & CITY GARDEN

LATIN NAME	COMMON NAME
<i>Achillea</i> 'Moonshine'	Yarrow
Its pale lemon yellow flowers and gray foliage combine beautifully with <i>Salvia x superba</i>	
<i>Anemone x hybrida</i>	Japanese anemone
White 'Honorine Jobert' is an elegant old cultivar.	
<i>Artemisia</i> 'Powis Castle'	
The only <i>Artemisia</i> to hold up well during the dog days of August.	
<i>Aruncus dioicus</i>	Goatsbeard
Resembles a giant white Astilbe.	
<i>Asarum europaeum</i>	European wild ginger
Without a doubt, one of the most elegant of evergreen ground covers.	
<i>Aster x frikartii</i>	
A non-stop bloomer! 'Wonder of Staffa' is a good form.	
<i>Astilbe x arendsii</i>	
Many cultivars in white, pink and red.	
<i>Brunnera macrophylla</i>	Siberian bugloss
Airy sprays of intense blue forget-me-not flowers.	
<i>Ceratostigma plumbaginoides</i>	Leadwort
An excellent late-blooming ground cover.	
<i>Chrysanthemum nipponicum</i>	Nippon daisy
Extremely tolerant of seaside conditions.	
<i>Cimicifuga racemosa</i>	Bugbane
Tall spires of white flowers above excellent divided foliage.	
<i>Chrysogonum virginianum</i>	Goldenstar
A useful, long-blooming ground cover around shrubs.	
<i>Coreopsis verticillata</i>	Thread-leaf coreopsis
Flowers profusely over a long season. 'Moonbeam' has pale yellow flowers.	
<i>Corydalis lutea</i>	
Try growing it in walls and between paving stones.	
<i>Dicentra eximia</i>	Fringed bleeding-heart
Its ferny foliage persists all summer, unlike that of <i>Dicentra spectabilis</i> .	
<i>Echinacea purpurea</i>	Purple coneflower
A difficult purplish-pink to combine with other colors.	
<i>Epimedium grandiflorum</i>	Longspur epimedium
Look for the white-flowered form. Good in dry shade.	
<i>Erigeron x hybridus</i>	Fleabane
Many cultivars in pink to violet and purple.	
<i>Eryngium bourgatii</i>	
Once a collector's plant, but now quite generally available.	
<i>Euphorbia polychroma</i>	Cushion spurge
The neat mound of foliage turns red in the fall.	

PERENNIALS FOR TOWN & CITY GARDENS

COLOR	BLOOM TIME	HEIGHT	SUN/SHADE	ZONES
yellow	SU	2'	☉	10-3/T
pink	LSU-F	3'-5'	☉ ●	10-6
—	—	2'-3'	☉	10-5/H
white	SU	4'-6'	☉ ●	9-3
brown	SP	6"	● ●	8-4
lavender	ESU-F	2'-3'	☉ ●	10-5/H
various	ESU-SU	2'-3.5'	☉ ●	8-4
blue	LSP	1.5'	☉ ●	10-3/H
blue	LSU/F	1'	☉ ●	10-5
white	F	1.5'-3'	☉	10-5/T
white	SU	4'-6'	☉ ●	10-3/H
yellow	SP-F	4"-1'	☉ ●	10-5/T
yellow	SU-F	1'-3'	☉	10-3/T
yellow	SP-F	12"-15"	☉ ●	10-5/H
pink	SP-SU	1'-1.5'	● ●	10-3/H
purple	SU	2'-4'	☉	10-3/T
red	SP	1'-1.5'	● ●	8-4
various	SP-F	1'-2.5'	☉	10-6
green	SU	1'-1.5'	☉	10-5
yellow	SP/LSP	1.5'-2'	☉ ●	9-3

PERENNIALS FOR TOWN & CITY GARDEN

LATIN NAME	COMMON NAME
<i>Gaillardia x grandiflora</i> Easy-to-grow and drought-tolerant.	Blanket flower
<i>Galium odoratum</i> A bright ground cover with dainty whorled leaves.	Sweet woodruff
<i>Geranium x oxonianum</i> 'Claridge Druce' Vigorous and free flowering.	Hardy geranium
<i>Geranium sanguineum</i> var. <i>striatum</i> A very well-behaved little plant.	Hardy geranium
<i>Helleborus orientalis</i> The hybrids range in color from pale green and white to pink and maroon.	Lenten rose
<i>Heuchera x brizoides</i> Red, pink or more rarely white flowers above evergreen foliage.	Coral bells
<i>Hosta plantaginea</i> Very fragrant, pure white trumpets high above the foliage.	August lily
<i>Kirengeshoma palmata</i> Often blooms right up to the first frost.	_____
<i>Liriope muscari</i> Late-season flower spikes are followed by pretty, shiny black fruits.	Big blue lilyturf
<i>Lysimachia punctata</i> Invasive, like most of the loosestrifes.	Yellow loosestrife
<i>Myrrhis odorata</i> The dark brown, ribbed seeds are even more ornamental than the tiny white flowers.	Sweet cicely
<i>Physostegia virginiana</i> 'Summer Snow' is a popular cultivar with pure white flowers.	False dragonhead
<i>Pulmonaria saccharata</i> 'Mrs. Moon' has leaves well marked with large, silvery spots.	Bethlehem sage
<i>Salvia x superba</i> All the cultivars of this sage are indispensable plants for the sunny garden.	Purple sage
<i>Saxifraga stolonifera</i> This familiar houseplant is surprisingly hardy out of doors.	Strawberry begonia
<i>Sempervivum tectorum</i> Best grown in rock gardens, walls or containers.	Hen-and-chickens
<i>Sidalcea malviflora</i> Several fine cultivars are available in a range of pinks.	Prairie mallow
<i>Thalictrum rochebrunianum</i> Truly a distinguished and elegant plant.	Meadow rue
<i>Tiarella cordifolia</i> A charming native for shaded gardens.	Foamflower
<i>Tricyrtis hirta</i> White orchidlike flowers spotted and speckled with dark purple.	Hairy toad-lily

PERENNIALS FOR TOWN & CITY GARDENS

COLOR	BLOOM TIME	HEIGHT	SUN/SHADE	ZONES
various	ESU-F	2'-3'	☉	10-3/H
white	LSP	6"-1'	●	9-3/H
pink	ESU-EF	1.5'-2'	☉ ●	9-4/H
pink	LSP-SU	1'	☉ ●	10-4/H
various	ESP	1.5'-2'	● ●	10-3/H
various	SP-SU	1.5'-2.5'	☉ ●	10-3
white	SU	2'	● ●	9-3
yellow	LSU/EF	3'-4'	●	9-5
purple	F	1'-1.5'	☉ ●	10-5/T
yellow	SU	1.5'-2.5'	☉ ●	9-4
white	ESU	3'-4'	☉ ●	9-4
pink	SU-F	2'-3'	☉ ●	10-3/H
blue	SP	1'-1.5'	● ●	9-3
purple	LSP-LSU	1.5'-3'	☉	10-5
white	LSP	1'-2'	● ●	10-6/H
pink	SU	1'-1.5'	☉	10-5
pink	SU	2'-4'	☉ ●	10-5
purple	SU/EF	4'-6'	☉ ●	10-5/H
white	LSP/ESU	1'	●	9-3
white	EF-LF	1'-3'	● ●	9-5

A black and white photograph of a garden bench in front of a dense hedge. The bench is a simple, dark-colored wooden or metal structure with a flat top and four legs. It is positioned in the center of the frame, facing the viewer. Behind the bench is a thick, dark hedge that fills the background. The ground in front of the bench is covered with light-colored gravel or small stones. The overall scene is a quiet garden setting.

GOOD HEDGES

FOR GOOD NEIGHBORS & OTHER GARDEN USES

BY LINDA YANG

Good hedges make good neighbors — maybe even better than fences (with apologies to Robert Frost). Hedgerows were used in the Middle Ages to define property and contain animals. But in the modern town, hedges provide the privacy that helps ensure sanity. A hedge is, after all, a polite screen for neighbors and passersby.

Clipped or unclipped, a hedge also tempers the wind, muffles the sound of traffic, provides elegant cover for unsightly views and a fine backdrop for flowers.

Whatever the season, it's never too late to start a hedge. If you're a yard gardener, prepare for planting by digging a trench or a straight line of holes, using a hose as a linear guide. If you're a rooftop gardener, begin with several containers that are at least 18 inches deep and wide, and are filled with a blend of equal parts topsoil, perlite and peat moss.

For each plant, stir in a shovelful of cow manure and a handful of a granular 5-10-5 fertilizer. After planting, add a mulch of bark chips and keep the area well watered. Leave a shallow depression around the

base of each plant so that moisture collects.

The spacing between the plants will depend on the rate of growth and ultimate size of the varieties you've chosen. The farther apart, the longer it takes for the hedge shape to form. In general, the space between should be somewhat less than the

plant's mature width. Rooftop plants and those to be sheared as formal hedges can be closer. Unsheared or informal hedge plants can be given a bit more room. Stagger species that are to be windbreaks or place them in multiple rows.

It will be more expensive, but it is best to use container-grown or balled and



A hedge of junipers and arbovitae planted in containers makes a strong architectural statement in this terrace garden.



A clipped boxwood hedge flanking a white wooden bench makes a formal statement.

burlaped plants for your hedge. In addition to providing instant gratification, container-grown plants are less likely to die, easier to plant and are often quite well branched. But more importantly, they don't need the severe pruning that bare-root plants must have at planting time to compensate for the root loss and encourage a dense twig mass.

Container plants need only be lightly sheared the first summer to encourage density. The following spring, deciduous plants and broadleaved evergreens should be more drastically clipped to force new growth and multiple branching, and to make the mass uniform. Needle evergreens should be lightly sheared except for

yews, which may need some trimming again in summer.

If you've started with very young plants, shear them once they begin to grow noticeably. Until they achieve full size, the shoots of the previous year's growth can be reduced by about one third. Or, as one nurseryman once put it, "If you want to have a tall tight hedge, you must first develop a small tight hedge — and then let it grow, gradually. Don't wait until it gets to the height you want before you start shaping it."

If a formally clipped hedge is your goal, don't trust your eye; use temporary stakes at each end and run a taut string as your guide. To keep the top branches from

HEDGE PLANTS THAT DO BEST WITH AT LEAST SEVEN HOURS OF SUN

Arborvitae (*Thuja occidentalis*)
 Barberry (*Berberis thunbergii*)
 Corkscrew willow (*Salix matsudana*
 'Tortuosa')
 False cypress (*Chamaecyparis*
pisifera)
 Hornbeam (*Carpinus caroliniana*)
 Juniper 'Skyrocket' (*Juniperus*
virginiana 'Skyrocket')
 Lilac (*Syringa* spp.)
 Autumn olive (*Eleagnus angustifolia*)
 Trifoliate orange (*Poncirus trifoliata*)

HEDGE PLANTS THAT TOLERATE A MINIMUM OF FOUR HOURS OF SUN

Bamboo (*Phyllostachys* spp.)
 Crabapple (*Malus* spp.)
 Firethorn (*Pyracantha coccinea*)
 Forsythia (*Forsythia* spp.)
 Hedge cotoneaster (*Cotoneaster*
lucidus)
 Hemlock (*Tsuga canadensis*)
 Holly (*Ilex* spp.)
 Inkberry (*Ilex glabra*)
 Peegee hydrangea (*Hydrangea panicu-*
lata 'Grandiflora')
 Privet (*Ligustrum vulgare*)
 Rose-of-Sharon (*Hibiscus syriacus*)
 Rhododendron (*Rhododendron* spp.)
 Winged spindle bush (*Euonymus*
alatus)
 Yew (*Taxus baccata*)

shading those on the bottom, slope each side slightly to create a somewhat wider base. A rounded top also reduces injury from the weight of piled-up snow.


Flowering species can be used as a decorative screen. Prune early spring bloomers right after they flower. Prune summer bloomers in spring or winter. Remember that even informal hedges need care to keep them from degenerating from casual to careless.

And finally, be sure to place your hedge on your side of the property line. As the plants mature and spread, a cantankerous neighbor has the right — legitimately — to chop off any intruders.

Hedge Plants For City Gardens

Many trees and shrubs can be used for hedges. Whether they're grown in containers or in the ground, plants for hedges are best chosen with a specific

purpose in mind. A hedge planned to discourage trespassers might include thorny species like hardy orange or roses. An informal divider that's primarily decorative might be developed from flowering shrubs like forsythia or rose-of-Sharon. For a formal design use plants amenable to repeated clipping, like Japanese holly or yew. And if you want to mix and match (as the British do), use plants with a similar rate of growth and equal tolerance of shearing.

Adapted from "Green Screen: The Hedge's Polite Rebuff" by Linda Yang, which first appeared in The New York Times in August 1989. 

URBANE WILDFLOWERS

BY PATTI HAGAN

City gardeners garden defensively, or not at all. But due to the difference between street culture and backyard culture, a good front-line defense is not at all the same as a good back-line defense.

Out front, city gardeners fight the elements: natural, unnatural and human. The exposed position, whether sunny or shady, tends to aridity. The exposed position also tends to encourage fast-flower, self-service blossom and plant thieves. Out back, city gardeners must defend against shade — the implacable shade of buildings and the insidious, creeping shade of leafing trees that by late spring obliterates many early spring sunspots.

In both garden cultures a new ecological succession is happening. The typical city front-yard story begins when, the first spring on the block, the green urban gardener puts out a normal suburban spread, say, ageratum, marigolds, pinks, geraniums, hybrid petunias, and almost immediately the plants go AWOL. They are uplifted, uprooted: they walk. Several re-installments later existential frontyard despair sets in: the beginning of frontyard wisdom.

For weeds and wildflowers are opportunists that abhor a vacuum. They will finish out the season for the gardener.

Next year, next stage. By this time the gardener may have staked out some vacant lots — reduced to first generation rubble — and may have noticed, among the shards of brick and mortar, rugged stands of wildflowers. The gardener may even have done some casual deadheading, dried the wild finds, turned the soil out front, and turned the seeds in for winter. After several years such a gardener has not a front yard, but a front meadow: doily-white overstory of Queen Anne's lace, embroidered with Deptford pink, chicory, moth mullein, sunflowers, butter-and-eggs, cinquefoil, spotted knapweed, clover, *Monarda*, butterfly-weed, *Centaurea*, fleabane, asters, wild sweet pea, the black-eyed Susans, evening primrose, *Thermopsis caroliniana*, *Liatris* and wild petunia with grasses. Rather than continue imperialistically to try to impose formal European gardening conventions on an intractable city site, the gardener has gone native.

The urban wildflower front meadow is



Handsome by day, Queen Anne's lace is a standout in the sodium-vapor dark of the urban night meadow.

sufficient unto itself. It takes little tending, but rewards attention. The meadow plants are so tough and grow so well *unencouraged* that any slight encouragement, such as compost or manure, causes them to grow wildly. In addition, this garden is almost impervious to drought.

Even better, since these flowers lack florist equivalents, they have no street value. If they're called anything by local passersby, they're called weeds. And on the street weeds are worthless. Flower

snitches pass them by. Furthermore, Queen Anne's lace, evening primrose and black-eyed Susan are great city night-flowers, standouts in the sodium-vapor-dark of the urban night meadow.

In addition, the wildflower meadow can be extended along a street demi-meadow fashion. Planted in street tree pits, these sturdy flowers can sometimes gain enough presence to discourage dogs and dog-owners from misusing the T-pits for latrines.

SOURCES

Bluestone Perennials

7211 Middle Ridge Road
Madison, OH 44057
800-852-5243

Canyon Creek Nursery

3527 Dry Creek Road
Oroville, CA 95965
916-533-2166
Catalog, \$1

Crownsville Nursery

P.O. Box 797
Crownsville, MD 21032
301-923-2212
Catalog, \$2

Eastern Plant Specialties

Box 226
Georgetown, ME 04548
207-371-2888
Catalog, \$2

Forestfarm

990 Tetherow Road
Williams, OR 97544-9599
Catalog, \$3

J.L. Hudson, Seedsman

P.O. Box 1058
Redwood City, CA 94064
Catalog, \$1

Heronswood Nursery

7530 288th Street NE
Kingston, WA 98346
206-297-4172
Catalog, \$3

High Altitude Gardens

Box 4619 • Ketchum ID 83340
800-874-7333
Catalog, \$2

Holbrook Farm

Rt. 2, Box 223B • Fletcher, NC 28732
704-891-7790
Catalog, \$2

Montrose Nursery

P.O. Box 957 • Hillsborough, NC 27278
919-732-7787
Catalog, \$2

Niche Gardens

1111 Dawson Road • Chapel Hill NC 27516
919-967-0078
Catalog, \$3

Peace Seeds

2385 Southeast Thompson St.
Corvallis, OR 97333
Catalog, \$5; list, \$1

Prairie Nursery

Box 306 • Westfield, WI 53964
608-296-3679
Catalog, \$3

Sunlight Gardens

Rte 1, Box 600-A, Hillvale Road
Andersonville, TN 37705
615-494-8237
Catalog, \$3

Tripple Brook Farm

37 Middle Road
Southampton MA 01073
413-527-4626



Celandine poppy and foamflower, which tolerate shade, are good candidates for the backyard city garden.

For those lacking the place or the patience to collect seed, most of the major seed houses offer packets of wildflower seed (labeled for region, climate, soil) and certain seedsmen specialize only in wildflowers.

Meantime, in the backyard shadehold, a similar story unfolds. Year one, the gardener attempts to push the shade tolerance of phlox, snapdragons and sunflowers and ends up with a lot of stretched-out, anorexic plants and little bloom. This

sort of unfluorescence also causes despair. Having lost the first backyard bout to shade, the gardener decides rather than curse the darkness where only mushrooms grow, to plant impatiens. Another year and the gardener curses the impatiens. There is such a thing as a boredom of impatiens.

A walk in the woods, or a visit to the Native Plant Garden of The New York Botanical, or the Local Flora Section of Brooklyn Botanic may implant ideas both

FRESH MEADOW WILDFLOWERS

Daylily	<i>Hemerocallis fulva</i>
Yarrow	<i>Achillea</i>
Queen Anne's lace	<i>Daucus carota</i>
Deptford pink	<i>Dianthus armeria</i>
Chicory	<i>Cichorium intybus</i>
Moth mullein	<i>Verbascum blattaria</i>
Sunflower	<i>Helianthus</i>
Butter-and-eggs	<i>Linaria vulgaris</i>
Cinquefoil	<i>Potentilla</i>
Spotted knapweed	<i>Centaurea maculosa</i>
Clover	<i>Trifolium</i>
Monarda, bee balm	<i>Monarda fistulosa</i>
Butterfly-weed	<i>Asclepias tuberosa</i>
Centaurea	<i>Centaurea</i>
Fleabane	<i>Erigeron philadelphicus</i>
Aster	<i>Aster</i>
Everlasting pea	<i>Lathyrus latifolius</i>
Black-eyed Susan	<i>Rudbeckia</i> , esp. <i>R. triloba</i>
Evening primrose	<i>Oenothera biennis</i>
Thermopsis	<i>Thermopsis caroliniana</i>
Liatris	<i>Liatris</i>
Wild petunia	<i>Petunia violacea</i>
Goldenrod	<i>Solidago</i>
Boneset	<i>Eupatorium perfoliatum</i>
Joe-Pye-weed	<i>Eupatorium purpureum</i>
Compass-plant	<i>Silphium laciniatum</i>
Coreopsis	<i>Coreopsis</i>

WOODLAND WILDFLOWERS FOR SHADE

Foamflower	<i>Tiarella cordifolia</i>
Solomon's seal	<i>Polygonatum biflorum</i>
Wild geranium	<i>Geranium maculatum</i>
Herb-Robert	<i>Geranium robertianum</i>
Cimicifuga	<i>Cimicifuga</i>
Spring beauty	<i>Claytonia virginica</i>
Wood aster	<i>Aster divaricatus</i>
Vancouveria	<i>Vancouveria hexandra</i>
Houttuynia	<i>Houttuynia cordata</i>
Lobelia	<i>Lobelia cardinalis</i> , <i>L. siphilitica</i>
Liriope	<i>Liriope</i>
Chelone	<i>Chelone lyonii</i>
Spiderwort	<i>Tradescantia virginiana</i>
Celandine poppy	<i>Stylophorum diphyllum</i>
Violet	<i>Viola</i>


wild and woodland. Again, the impulse is to go native. Woodland wildlings need the protected, even sheltered backyard environment, where nothing much heavier than a butterfly or bee will ever land on them. Provided they are properly coddled — with leaf mold, humus and moisture — these plants can do well in the city. They can be ordered by mail — but should only be ordered from nurseries that *propagate* the natives they sell. (Caveat emptor! Under Federal Trade Commission nursery guidelines wild-collect-



Queen Anne's lace, black-eyed Susans and other denizens of the urban front meadow take little tending. Even better, because they have no florist equivalents, flower snitches pass them by.

ed plants temporarily parked and "grown in the nursery row for at least one growing season before being marketed" can be sold and advertised as "nursery grown.") Introduce them in spring or fall. Since the flowers tend to be minute, they are best planted in stands of a kind. Over the years they will self-sow and run, eventually massing like true woodland ground covers.

Habitués of woods shade can become quite at home, even comfortable, in city shade. Woods plants to order for a start

include foamflower, Solomon's seal, the wild geraniums (cranesbill and herb Robert), *Cimicifuga*, spring beauty, wood aster, *Vancouveria hexandra*, *Houttuynia*, the lobelias (*L. syphilitica* and *L. cardinalis*), *Liriope*, *Chelone* and the ferns — Goldie's, cinnamon, ostrich, sensitive, hay-scented, Christmas — to frond the fenceline, not forgetting the violets, perhaps the least shrinking, most aggressive of wildflowers, that will thrive even for those lacking green index fingers. 

FRONT DOOR LANDSCAPES

BY MARY RILEY SMITH

The front yard deserves more attention than it gets. As the setting for a house and as the daily connection to the community, the front property presents design opportunities and challenges of its own. It may be time now to look at your front yard with new eyes. If it's the sunniest part of your property it may be an ideal site for a garden. Even the smallest entry court of a city house offers opportunities for attractive and suitable planting.

Old-Fashioned Front Yards

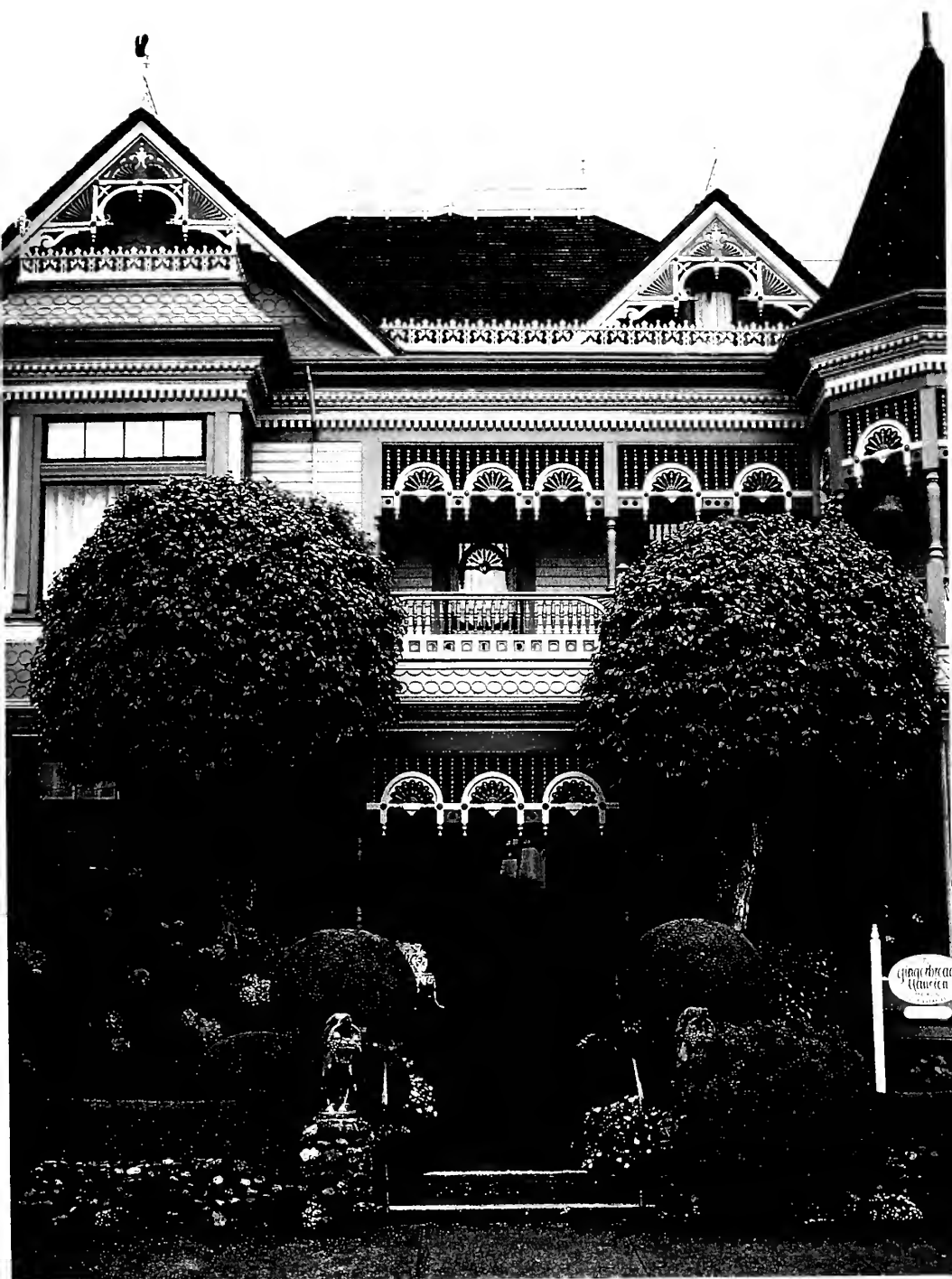
A look at the traditions of American front yard design may provide ideas for today's front landscapes. In New England enclosed cottage gardens at the front door provided herbs and vegetables for daily use as well as visual pleasure. In the Southwest Spanish influence dictated courtyards enclosed by adobe or stucco walls. Also used in Florida, this style provides a shady and private entrance as well as an outdoor room. Often a fountain is featured and surrounded by plants in pots. And in old neighborhoods of New Orleans and Charleston, entrances are on the side of the house and are arrived at through a gate in a fence

along the sidewalk. These enclosed, self-contained gardens were largely ignored in the late nineteenth and twentieth centuries when more romantic notions of landscaping were popular.

Open Front Yards and Foundation Plantings

Open front yards with little delineation between properties grew out of the nineteenth century interest in natural landscapes. Boundaries and property lines were blurred by loose plantings rather than walls or fences, giving the impression of flowing space. Open properties also seemed more democratic than those shut off from view by fences and gates.

The flowing landscape prevailed even as properties were shrinking in the 1940s and '50s, and in most American towns front yards are usually contiguous or have minimal separation. Along with open front yards, foundation planting is also prevalent. The passion for shrubs set against the base of houses started with the Victorians' large-scale buildings. Shrubs set against these big houses made them appear to be grounded to their sites. In



The front yard is the place to show off your horticultural skills. This gingerbread house is embraced by the carefully clipped specimens.

time, as houses and lots shrank, foundation planting persisted. Shrubs planted along the foundation quickly dwarfed a small house. To keep yews, forsythia and azaleas from blocking windows severe pruning is necessary, creating almost bonsai-like bushes.

Shearing front garden shrubs has also led to a vertical/horizontal/vertical pattern across the facade. Vertical evergreens flank the front door, and lines of clipped shrubs run horizontally under the front windows, ending with vertical shrubs at the corners of the house. The uniformity of these front yard designs could be nicknamed the "American Front Yard Style."

Front Yard Basics

The front yard may be the best place on your property to have a garden, or perhaps show off your horticultural skills while simultaneously perking up the neighborhood. One of the first things to consider is how the front yard and its plantings set off your house. The landscaping should enhance it — not hide it. A large tree or shrub some distance from the building softens hard architectural lines. The same plant growing against the building distracts from the architecture and makes it seem cramped. Suitability is important, too. Consider the architectural style of the house. If it's Victorian, for instance, bright flowers, urns, a fence and topiary shrubs are appropriate. Simple



An informal planting softens the harsh lines of urban buildings.

streamlined plantings are more in keeping with modern architecture.

Function is also important. Does the design adequately meet service needs such as garbage pick-up, car parking and entrance to the house? Is the entry well marked, lighted and welcoming? In older towns and cities where there are rear alleys for garages and garbage pick-up, the front yard may only have a path from the sidewalk to the front door. In this case, a comfortable walk and lighting are of paramount importance.



Carefully clipped evergreen corkscrews echo the strong vertical lines of the elegant front door.

When deciding on the best use of a front yard, you might begin by addressing the question of the service functions — driveway, parking, garage, garbage pickup and paths. To what extent should they define the front of the property? And if these elements dominate, how might they be minimized or softened?

Garage, Driveway, Parking

Modern houses generally have a garage and driveway facing the sidewalk, on the same plane as the front of the house. Treat-

ing them as a single service area can diminish clutter by confining visitor parking, garbage containers, gas tanks and storage to one space. If visitors can park on the street, a driveway will suffice. When visitors must park on your property, a pull-in area next to the driveway might be needed for extra cars. If there is a choice, keeping the driveway to the side of the property enhances a feeling of spaciousness in the front. Likewise, a center path from the sidewalk to the front door can be re-routed to the side.

Diminishing the impact of driveways, cars and other service elements is a worthy goal. A fence or hedge parallel to the driveway can serve as a divider, separating it from the rest of the front property, much like a room divider, reducing its visual impact. A gate through the hedge or fence also creates a psychological passage. Think of the garage and driveway as a work space and the rest of the front as an attractive setting for your house.

Public or Private?

Another major consideration is whether you want the privacy that hedges or fences provide, or openness and curb appeal. Reasons for enclosing the front may be aesthetic or practical. Practical concerns might include keeping children or pets enclosed, planting a windbreak, reducing traffic noise or, simply, having privacy. Aesthetic considerations include creating vertical planes in a flat landscape for variety or as a backdrop for gardens, blocking an unattractive view or easing the transition between the house and driveway or street. In a busy urban area, closing the small space in front of a townhouse creates a psychological transition from the hustle and bustle of the sidewalk. Whether the enclosure is a solid brick wall or a filigree iron fence typical of nineteenth century houses, delineating your property offers psychological privacy, if not actual privacy. But before deciding on a front enclosure, check local zoning rules. Some communities have height restrictions on fences and hedges along sidewalks.

In towns where zoning laws forbid fences or hedges a small enclosure near the front door or along a front path can provide seclusion. Even if turning the front into a garden isn't your goal, a fence, possibly with a gate and arbor, adds distinction.

Assuming you are able to close off the front property, style, cost and function will affect your choice of materials. If the pur-

pose of a front enclosure is privacy, a six-to-eight-foot tall hedge or fence will do the job. A lower enclosure will keep children and pets in or separate the driveway. Walls and fences are more expensive to install than hedges, and most Americans choose hedges or trees to enclose the yard. But don't forget that while a hedge may be less expensive to install, it will require clipping. When considering your front enclosure, be sure to choose a style of fencing or hedging compatible with your home. An informal grape stake fence, for example, is incompatible with a formal brick house. A painted wood fence or an evergreen hedge might be better.

Structures

If you are planning to have a garden in front of the house, consider giving it a framework or backdrop. Although it is possible to create island beds in the front lawn, your design will be improved with such architectural elements as fences, hedges or paths. When designing these structures and choosing plants, don't forget how the garden appears in winter. Tough evergreens, for example, which cheer frosty Northeast and Midwest landscapes, also set off bright perennials and annuals the rest of the year. In the mild-wintered South and West look for plants which play a supporting role for year-round interest, require minimal care and have an elegance that makes them pleasing all year. A bench, sculpture, a sundial or pots and urns provide winter personality, too.

In dense urban areas where townhouses and apartment buildings with little or no garden space are the norm, horticulture plays a vital role. The porch of a brownstone, for example, might be enhanced by planters painted shiny green or black filled with evergreens carefully pruned into architectural shapes. Seasonal interest can be provided by small spring bulbs and bright annuals.




Frequently used entrances can be enlivened with plants. Here, ivy clammers across the steps and climbs up the facade of a brownstone rowhouse.

Such planters can become miniature gardens. An apartment building entry may be enhanced with elegant planters in scale with the facade and filled to overflowing.

Entrances

Cast a critical eye on your most frequently used entrance, no matter if it is the kitchen or front door. It is easy to stop noticing an entrance used several times a day. Would your trips be more pleasant if you were passing through a small herb garden? Pots of topiary herbs on either side of the door

not only add charm but are handy for cooking. A fragrant vine on a porch rail or an espaliered pyracantha, orange-berried in winter, make daily trips in and out that much more pleasurable. A large front porch is even more welcoming with a swing or glider, some chairs and pots flanking the door and steps.

Your front yard can be more than a polite landscape. It can be a bright garden for neighbors or an intimate enclosed space for privacy, as well as a charming landscaped picture from inside. 

TAKING CHARGE OF YOUR STREET TREE

BY NINA BASSUK

After you've finished landscaping your windowsill, harvesting the pole beans growing up your fire escape and converting your backyard into an oasis of green, consider taking charge of the tree in front of your house. Yes, in most cities these street trees are owned by the municipality. But in some real way, because you experience their shade and loveliness multiple times a day, they are yours — and they are in trouble.

Consider this: The average lifespan of a tree in a downtown site is just a few years. Only about half the available city planting spaces actually contain trees at any given time. For every tree planted, approximately four are removed. And of every dollar spent on street maintenance and improvements, a mere penny or two goes to trees.

Why are street trees doing poorly?

Below ground the factors affecting tree root growth can be numerous. Deicing salts (NaCl primarily) in North American cities where winter driving conditions are

hazardous can do tremendous damage to street trees. High salt levels in the soil decrease the availability of water to the roots, causing a "chemical drought." Moreover, chloride ions are readily taken up by plant roots and can accumulate to toxic levels in the leaves, resulting in marginal leaf necrosis or "scorch." Our analysis of chloride in *Tilia cordata* 'Greenspire' trees growing in New York City showed chloride levels to be 1.8 percent of leaf dry weight, well above acceptable levels. Sodium can also have a detrimental effect on soil structure, leading to increased soil compaction. And salt spray from dissolved road salts can desiccate evergreen leaves directly.

Barriers to root growth resulting in de facto containerization of street trees is also a common occurrence. Utility pipes, asphalt and concrete curbs, rubble in the soil and underground subways and basements, as well as soil compaction, all serve to limit the amount of soil tree roots have



Street trees alongside containers with colorful annuals soften cityscapes and add charm.

to explore to acquire water and nutrients. Compaction may limit root growth directly by mechanical impedance, or indirectly by reducing soil pore space and thus oxygen diffusion to the root zone. Waterlogged conditions often follow, aggravating damage to root systems due to lack of oxygen.

Urban soil can contain anything from good topsoil to brick rubble and builders' fill. Because many of these materials con-

tain limestone, street tree pit soils are often alkaline, which limits the availability of certain nutrients such as iron and manganese. Pin oak (*Quercus palustris*) is particularly sensitive to high pH soils, resulting in chlorosis.

Urban soils can be extremely variable in fertility and toxic substances as well. "Graywater" is often poured onto street tree pits in a well-meaning attempt at



A mass of impatiens beautifies a street tree pit. Although flowering annuals will compete with tree roots for much needed water and nutrients, they will remind you to water during hot or dry spells.

watering. However, if this spent wash water contains bleach or other toxic chemicals it can be lethal.

Above ground there are still other ways in which the city causes stress in street trees. Foremost among these is reradiated heat from buildings, asphalt, car tops and concrete. The hotter the air temperature around tree canopies, the faster trees lose water and deplete their already limited underground supplies. A study conducted by Cornell's Urban Horticulture Institute in New York City documented that air temperature may be as high as 22 degrees F hotter on the street than the

official weather reports indicate.

In certain urban areas, wind also increases leaf desiccation as it speeds up through the "urban canyons" between tall buildings.

Tall buildings, causing false horizons, alter light patterns for many urban trees. Trees on the north side of a city block see far less direct sunlight than those on the east, west or south sides.

Air pollution is often cited as a problem for plant growth in cities; however, this depends very much on the air drainage patterns of a particular location. In New York City it is rare to see symptoms of air pollu-



Marigolds, ivy and elegant wrought-iron edging help prevent damage by bicycles, cars and trucks.

tion injury whereas in Los Angeles it is common. The major pollutants are ozone, SO_2 , nitric oxides and peroxyacetyl nitrate(PAN).

Finally, much is said about vandalism of plants in cities. However, on the streets of New York the more frequent damage done by cars, trucks, bicycles and urban construction has more severe consequences than the breaking of twigs by people. Trees planted too close to curbs suffer regular injury by motorists.

When faced with all these stresses it is in fact incredible that we have as many healthy street trees as we do.

What can you do to take charge of your trees?

1. Water, water, water. Because of restricted rooting space and increased heat load, street trees often experience water stress — not enough water to meet the needs of the tree. For a small tree you can slowly pour in about ten gallons of water every five days during periods of little rain and/or hot temperatures. However, don't dump spent wash water onto trees when a caustic detergent or bleach has been added to the water. This can cause rapid root damage. It may be necessary to use a fork to gently loosen the soil



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Ivy, daffodils and other plants in a street tree pit help discourage visits by dogs.

you to water the ground (i.e. the tree), and may help discourage the parking of bicycles and trash cans at the tree's base. It will also help prevent further soil compaction. In some instances, ground covers may also discourage dogs. While occasional dog "visits" should not harm the tree, excessive dog urine can be toxic to tree roots.

4. What can you do about deicing salts and trees? If you are the perpetrator, begin using sand on your sidewalk or even a small amount of granular fertilizer. Both of these are better than salt. In any case, shovel salt-laden

surface to about a two-inch depth so that water can be more easily absorbed.

2. Keep the soil around the tree free of garbage, trash cans, bicycles or construction materials. This will help protect the trunk from abrasion and protect the soil surface so that oxygen can freely move into the soil and to the roots. Also, do not add soil on top of the root zone. Do mulch the soil surface in at least a three-foot radius around the tree with coarse shredded bark or wood chips. This helps to retain moisture needed for tree growth and reduces compaction around the base of the tree.

3. Should you plant ground covers around the tree? Yes and no. No, because these plants will compete with tree roots for much needed water and nutrients. Yes, because the presence of small flowering annuals such as impatiens will remind

snow away from tree roots. In late winter or early spring when the soil has thawed, flush any remaining salts through the soil by watering with at least 10 to 20 gallons of water.

5. Become involved. Take a course or teach yourself the proper way to prune young trees so that you may remove broken, dead or crossing branches, competing leaders and basal suckers around the tree trunk to insure healthy, vigorous growth.

Enjoy your trees. Appreciate how they give character to your neighborhood, how they make it bearably cool in summer and shield you from wind in the winter. While they produce necessary oxygen, they also trap dust particles, provide habitats for birds and buffer street noise. The livability of our cities is directly related to the health and vigor of our street trees.

THIRTY TREES FOR URBAN AREAS

<i>Acer campestre</i> (Hedge maple)	Zone 4. 25-35', rounded. Tolerates varied conditions, including high soil pH. Relatively pest free; easy to transplant. Moderate to good soil-salt tolerance.
<i>Aesculus x carnea</i> 'Briotii' (Red horse chestnut)	Zone 5. 40-50', rounded. Adaptable to high pH. Prefers moist, well drained sites. Less susceptible to leaf scorch than common horse chestnut. Red flowers. Fruit litter may be a problem in some areas.
<i>Amelanchier</i> (Serviceberry) 'Autumn Brilliance', 'Cumulus', 'Robin Hill Pink', 'Tradition'	Zone 5. 20-30', upright. Early white flowers. Prefers moist, acid soil but tolerates pH up to 7.5. Good yellow-to-red fall color.
<i>Carpinus betulus</i> (European hornbeam)	Zone 5. 40-60', upright, oval. Tolerates drought, heavy soil, wide pH range. Intolerant of soil salt. 'Fastigiata' is an upright form.
<i>Carpinus caroliniana</i> (American hornbeam)	Zone 3. 30', rounded, spreading. Prefers shade and moist, slightly acid soils; will tolerate intermittent drought. Good orange-red fall color.
<i>Celtis occidentalis</i> (Hackberry)	Zone 3. 40-60'. Pyramidal when young, open and irregular when mature. Tolerates varied soils, drought, high pH, wind, light shade. Salt-sensitive. 'Prairie Pride' reportedly an improved cultivar.
<i>Cercidiphyllum japonicum</i> (Katsura tree)	Zone 5. 50-80', rounded, spreading. Best in evenly moist soils, protected sites. Does not tolerate compaction, heavy soils. Tolerates light shade. Relatively pest free. Good fall color.
<i>Corylus colurna</i> (Turkish filbert)	Zone 5. 50-70', pyramidal. Tolerates drought, heat. Adaptable to varied pH. Pest free.
<i>Crataegus viridis</i> 'Winter King' (Winter King hawthorn)	Zone 4. 20-35', vase-shaped, thorny. Tolerates drought, high pH. Disease resistant. White flowers, good fall color, persistent red fruit.

<i>Eucommia ulmoides</i> (Hardy rubber tree)	Zone 5. 40-60', rounded, wide spreading. Drought tolerant, pH adaptable. Transplants readily. Pest free. Needs full sun. May be marginal in Zone 5.
<i>Fraxinus excelsior</i> 'Hessei' (European ash)	Zone 4. 60', rounded. Adapts to high pH. Borers may be a problem in warm climate.
<i>Ginkgo biloba</i> (male) (Ginkgo)	Zone 3. 60-100', pyramidal when young, irregular when older. Narrow upright cultivars available ('Princeton Sentry', 'Lakeview'). Tolerates high pH, moderate salt. Pest free. Yellow fall color.
<i>Gymnocladus dioica</i> (Kentucky coffee tree)	Zone 4. 70-80', oval, spreading. Tolerates alkaline soils; pest free. Grows slowly at first. Use male trees to eliminate fruit litter.
<i>Koelreuteria paniculata</i> (Goldenrain tree)	Zone 5. 30-40', rounded. Tolerates drought, alkaline soil, salt. Yellow flower clusters in midsummer.
<i>Mestasequoia glyptostroboides</i> (Dawn redwood)	Zone 5. 70-100', pyramidal. Tolerates pH up to 7.0; does not tolerate soil salt. Favors moist sites. Remove lower branches for streetside use.
<i>Nyssa sylvatica</i> (Black gum)	Zone 5. 40-70', pyramidal. Tolerates wet soils; prefers acid soils (pH 5.5-6.5). Pest free; bright red fall color. Difficult to transplant; use small sizes only.
<i>Ostrya virginiana</i> (American hop hornbeam)	Zone 3. 30-50', rounded. Tolerates light shade; pH adaptable; pest free. Prefers moist soils, but established trees tolerate dryness. Very poor salt tolerance.
<i>Prunus</i> 'Accolade' (Accolade' flowering cherry)	Zone 5. 20', rounded spreading. Best in soil near neutral (pH 6.5-7.5) Rapid grower. Semidouble pink flowers; attractive bark.
<i>Pyrus calleryana</i> (Callery pear) 'Chanticleer', 'Redspire', 'Autumn Blaze', 'Aristocrat', 'Bradford' 'Fauriei', 'White House'	Zone 5. 30-50', rounded, pyramidal. Tolerates drought, salt, high pH ranges. Attractive white spring flowers. Graft incompatibility can be a severe problem. Some varieties no longer recommended because of tendency for limb breakage.

<i>Quercus bicolor</i> (Swamp white oak)	Zone 3. 50-60', broad oval, rounded top. Tolerates temporary flooding, wet soils, somewhat dry soils. Acid soils are best. Poor salt tolerance.
<i>Quercus imbricaria</i> (Shingle oak, bur oak)	Zone 5. 40-60', rounded. Tolerates high pH, drought. Massive trees need adequate space. Use small sizes when transplanting.
<i>Quercus rubra</i> (Red oak)	Zone 3. 60-75', rounded. Tolerates dry, compacted soils. More adaptable to high pH than most oaks. Good salt tolerance. Oak wilt a serious problem in the South.
<i>Quercus shumardii</i> (Northern shumard oak)	Zone 6. 60-80', rounded, oval. Tolerates pH up to 7.0. Easier to transplant than some oaks.
<i>Sophora japonica</i> (Scholar tree) 'Regent' 'Princeton Upright'	Zone 5. 50-70', dense rounded. Tolerates drought, salt, compaction, wide pH range. Fixes nitrogen. Attractive, cream-colored summer flowers.
<i>Syringa reticulata</i> (Japanese tree lilac) 'Ivory Silk', 'Summer Snow'	Zone 3. 20', rounded. Tolerates drought, high pH; intolerant of standing water. Large, creamy flowers. Suitable for large containers.
<i>Taxodium distichum</i> (Bald cypress)	Zone 4. 50-70', columnar when young, wide-spreading and open when mature. Tolerates wet soils and pH up to 7.0. Moderate soil salt tolerance.
<i>Tilia x euchlora</i> (Crimean linden)	Zone 4. 50', rounded. Adaptable to high soil pH. Easier to transplant and more drought-resistant than <i>Tilia cordata</i> .
<i>Tilia tomentosa</i> (Silver linden)	Zone 4. 60-80', pyramidal. Tolerates high soil pH; tolerates drought and heat better than <i>T. cordata</i> . Less susceptible to Japanese beetle than other lindens. Attractive white pubescence on underside of leaves.
<i>Ulmus parvifolia</i> (Chinese elm)	Zone 5. 30-50', rounded. Disease-resistant. Tolerates drought and wide pH range. May be marginal in Zone 5.





ALL THE WORLD IN A WINDOWBOX

BY ANNE HALPIN

For city dwellers, gardening often means turning adversities into opportunities. You might, for example, have a small balcony with little sun and lots of wind, or a small, shady courtyard with worn-out soil, or an exposed, gusty rooftop. But you certainly have windows. And if there are windows, you can garden in windowboxes.

This means you can grow flowers and foliage plants for sun or shade, favorite herbs for cooking, small salad greens and other diminutive vegetables, miniature roses, little bulbs and even small evergreens. You can change plants with the seasons for different displays in spring, summer and fall.

A windowbox not only changes the view from inside, it also gives something back to the neighborhood. Boxes full of plants brighten buildings and soften facades of stone or brick with a flash of color and greenery.

If strong winds are a problem on the side where your windowbox will go, concentrate on low plants with sturdy stems and tough leaves. Avoid trailing or climbing vines, thin-stemmed flowers and delicate leaves. And be sure to mount the boxes securely on strong brackets.

Windowboxes have great charm when planted with care and designed with most of the same considerations used in planning an effective garden bed or border. You can create different styles, just as you can in

larger gardens.

But whatever the style, choose plants in a gradation of heights to create an illusion of depth and space: the tallest plants in the back, medium-size plants next and low edgers and trailing vines along the front and sides of the box. As a treat for yourself, hide a few smaller plants behind the tallest ones so you

can see them from inside. That way you won't always have to look at the back of the design.

You might opt for a formal look, with neatly groomed plants in a balanced, symmetrical pattern designed along a straight horizontal axis punctuated by one or more verticals. The plants in a formal windowbox should be balanced in size and shape from side to side and from front to back. If the box contains more than one vertical plant, space them out evenly along its length. The plants in formal windowboxes must also be meticulously groomed, with not a leaf amiss, and this is the place for a small, carefully pruned evergreen, or perhaps a small topiary. To achieve the serenity of a formal design, keep the color scheme simple — perhaps just green foliage contrasted with shimmering white flowers, or a combination of green, white and red or blue.

The formal look is in marked contrast with a romantic, overflowing design. Look for colorful plants that arch gracefully or tumble and cascade. A romantically styled windowbox is full of movement and life. The colors can be soft or bold; the combinations, harmonious and related or a riot of mixed hues. If the windowbox is in bright sun, clear, strong colors look best — pastels tend

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Snapdragons, petunias, lobelia and vinca create a spectacular display.

to fade. On the other hand, pastels and white are ideal for enlivening the shade.

Special effects are also possible in windowboxes. For a tropical look, use a bold-leaved houseplant — *Fatsia japonica*, perhaps, or a young *Dieffenbachia*, a Chinese evergreen (*Aglaonema*), *Dracaena* or Hawaiian ti plant, (*Cordyline ter-*

minalis). Philodendron or pothos can trail over the edges of the box. You might prefer a miniature rose garden, or even a woodsy planting of ferns, primroses and violets.

The size of the rootball determines what will grow in a windowbox. Small plants with modest root systems fare best. These compact plants also work best visually — larger plants may seem out of scale with the size of the box. Think of windowboxes as gardens-in-miniature.

The universe of flowers for windowboxes is surprisingly large, encompassing annuals, perennials and bulbs. Small perennials such as *Iberis sempervirens* (evergreen candytuft) and *Aurinia saxatilis* (basket-of-gold) will perform ably in a windowbox. But for lavish bloom over a longer period, annuals are the way to go. My favorite combinations for a sunny spot are the violet-blue spikes of *Salvia farinacea* 'Victoria' in the rear, silvery dusty miller and verbena in rose, pink and lavender in the center and variegated vinca spilling over the front and sides. (Some of the verbena will tumble, too, as it grows.)

If herbs are your passion, consider anise, dill, fennel or sweet basil for the back of a large box, with thyme or curly parsley for

A SAMPLING OF PLANTS FOR WINDOWBOXES

FULL SUN

Antirrhinum majus — Snapdragon
Arctotis stoechadifolia — African daisy
Calendula officinalis — Pot marigold
Callistephus chinensis — China aster
Celosia plumosa — Woolflower
Centaurea cyanus — Bachelor's button
Cheiranthus spp. — Wallflower
Chrysanthemum spp. — Garden mum, pyrethrum
Cineraria maritima — Dusty miller
Crocus spp.
Dahlia spp.
Dianthus spp. — Garden pinks, sweet william
**Dimorphotheca sinuata* — Cape marigold
**Eschscholzia californica* — California poppy
**Gazania* spp. — Treasure flower
Gomphrena globosa — Globe amaranth
Iberis umbellata — Globe candytuft
Impatiens spp.
**Mesembryanthemum crystallinum* — Ice plant
Ocimum basilicum — Sweet basil
Origanum majorana — Sweet marjoram
O. heracleoticum — Greek oregano
Pelargonium spp. — Zonal geranium, ivy-leaved geranium, scented-leaved geraniums
Petunia x hybrida
Phlox drummondii
**Portulaca grandiflora* — Rose moss
Salvia spp. — Sage
Tagetes spp. — Marigold
Tropaeolum spp. — Nasturtium
Verbena x hybrida
Zinnia spp.

*Indicates plants especially tolerant of hot, dry conditions

SUN OR PARTIAL SHADE

Allium spp. — Chives and garlic chives
Browallia speciosa
Buxus spp. — Boxwood
Catharanthus roseus — Madagascar periwinkle
Chamaecyparis spp. — False cypress
Chionodoxa spp. — Glory-of-the-snow
Coleus blumei
Hedera helix — English ivy
Hosta spp. — Small hostas
Hyacinthus orientalis — Hyacinth
Lobelia erinus
Lobularia maritima — Sweet alyssum
Muscari spp. — Grape hyacinth
Narcissus spp. — Daffodil and narcissus
Petroselinum spp. — parsley
 Salad greens
Scilla siberica — Siberian squill
Torenia fournieri — Wishbone flower
Vinca minor — Periwinkle
Viola spp. — Pansy, viola, violet

PARTIAL AND LIGHT SHADE

Aucuba japonica — Gold dust tree
Begonia spp. — Wax and tuberous begonias
Caladium spp.
Chlorophytum comosum — Spider plant
Cordyline terminalis — Ti plant
Dracaena marginata — Dragon tree
Fatsia japonica
Galanthus spp. — Snowdrops
Impatiens spp. — Bedding impatiens
Primula spp. — Primrose
Viola cornuta — Horned violet

the front. The middle ground can be filled with small-leaved basil, chives, oregano, sweet marjoram, flat-leaf parsley, sage or coriander.

Salad greens also grow happily in a windowbox. Try baby head lettuces (such as 'Little Gem', 'Tom Thumb', or 'Red Montpelier'), leaf lettuces, arugula, corn salad or mache, sorrel or cress.

Or cultivate radishes, round-rooted carrots, little beets, baby eggplant and small determinate tomatoes in your tiny windowbox farm.

To tie your windowbox gardens to the cycling of the seasons, plant in removable plastic liners or individual pots and rotate the plants. For spring, try such hardy bulbs as miniature narcissus, crocuses, scilla and glory-of-the-snow, or such cool-weather flowers as pansies or primroses. Summer can bring some interesting selections other than the ever-popular geraniums, petunias, impatiens and marigolds. There are blue- and purple-flowered *Ageratum*, *Browallia*, *Brachycome*, *Felicia*, *Nierembergia*, *Phlox drummondii*, *Fuchsia*, *Salvia* and *Iberis umbellata*. Sunny yellows and oranges can be found in nasturtiums, *Anthemis*, *Coreopsis*, *Celosia*, *Arctotis* and *Dimorphotheca*. Some red and pink possibilities are dwarf snapdragons, *Pyrethrum*, *Verbena*, China aster, *Phlox drummondii*, fuchsias, *Nicotiana*, *Catharanthus*, Shirley poppy, *Gomphrena*, *Portulaca* and *Zinnia*.

In windowboxes, as in gardens, autumn seems to be synonymous with chrysanthemums. They are appealing, certainly, and easy to obtain, although best discarded when they finish their bloom. For some-

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Lobelia, geraniums, alyssum and browallia provide colorful blooms and contrasting leaf textures.

thing different try colchicums, autumn crocus, dwarf Michaelmas daisies, Japanese anemone or *Sedum* 'Autumn Joy'.

The best soil mix for windowboxes is the same light, porous, well-drained but water-retentive medium useful for pots and other types of containers. It is important to include some organic mat-

ter in the medium to aid moisture retention. A good soil mix for windowboxes is one part potting soil, one part crumbled compost, leaf mold or peat moss, and one part vermiculite or perlite. For a lighter weight mix, increase the perlite.

Watering is critical; small containers dry out quickly, especially in hot, windy weather. In some locations you may need to water your windowboxes once or even twice a day in summer. But check first; overwatering starves roots for oxygen and eventually causes them to rot. Poke a finger into the soil. If it's dry an inch or two below the surface, it's time to water. Don't wait until the plants wilt. Water-stressed plants grow slowly and produce few, and poor-quality, flowers. When you do water, water thoroughly.

Fertilize annuals and vegetables every two to three weeks with an all-purpose liquid fertilizer. Most herbs do best with a light monthly feeding, or less. Give shrubs and trees a dose of a balanced fertilizer two or three times during the growing season. Windowbox bulbs need no fertilizer since they are often discarded after they've bloomed. To prolong flowering and keep the box looking its best, pick off spent flowers and dead leaves regularly. 



A large clay pot provides a home for several *Campanula* species, the graceful bellflowers.

SMALLER MAY BE BETTER

DWARF CONIFERS AND ROCK GARDEN PLANTS

BY LAWRENCE B. THOMAS

The first considerations for the town and city gardener are space and size. Quite simply, will the tree or plant fit — today, tomorrow and ten years from now?

Some of the so-called “dwarf” conifers can top out at over a 100 feet at maturity, so it is imperative that you research the plants carefully and choose only those that have true dwarf characteristics — forms that naturally are slow-growers, that never attain the size of the parent species from which they derived.

The ones we shall consider here are, for the most part, varieties that are 1) slow-growing; 2) of reasonably easy culture; 3) able to put on a good show for some years without taking up much space; and 4) adaptable to containers and, therefore, useful for terraces and small gardens.

Most of them require at least six hours of full sun, though some of the variegated forms need protection from the hottest sun. All, without fail, do best in well-drained, sandy, acid loam. Fertilizer is rarely needed for the dwarfs since it stimu-

lates unwanted growth — although most will respond favorably to an occasional winter top-dressing of manure. Drainage, however, is a prime consideration, and heavy clay soil must be modified with copious amounts of sand, very fine gravel or chicken grit. (The latter is particularly good for container-grown plants.)

When planting nursery-bought plants that have been grown in containers, it is crucial to tease the root ball apart before planting to encourage new root growth.

There are literally dozens of varieties to choose from, and the following represent a mere beginner's list, though there are some selections that should please even the most discriminating gardener. It is crucial when looking for these plants to specify them by their Latin name, for there are many varieties with similar names to confuse the unwary gardener. U.S.D.A. hardiness zones follow each Latin name in parentheses. But check your local arboretum, nurseries or Cooperative Extension Agent for your particular zone.

CEDAR

Cedrus atlantica 'Glaucu Pendula' (6) — while not truly dwarf, the weeping blue Atlas cedar is notable for its ghostly gray-blue needles and its graceful, drooping limbs that can be espaliered into interesting forms.

FALSE CYPRESS

Chamaecyparis obtusa 'Nana Lutea' (5) — the dwarf yellow Hinoki false cypress will reach a foot in height, needs semishade to preserve its striking golden foliage and will brighten the darkest corner of your garden.

Chamaecyparis obtusa 'Juniperoides' (5) — a dwarf Hinoki false cypress that forms a tight mound of juniperlike foliage.

Chamaecyparis pisifera 'Squarrosa Intermedia' (5) — this sawara false cypress forms a 20-inch mound of silvery-gray, feathery foliage.

HEMLOCK

Tsuga canadensis 'Cole's Prostrate' (4) — a named variety of Canadian hemlock that hugs the ground and cascades gracefully over a rock or down a slope.

Tsuga canadensis 'Jeddeloh' (4) — another Canadian hemlock that forms a compact, drooping, flat-topped mound with a bird's nest-like hollow in its center.

JUNIPER

Juniperus communis 'Compressa' (5) — The pencil-like growth of this dwarf Irish juniper rarely tops 24 inches, making it ideal for troughs and containers. A nice vertical accent.

Juniperus communis 'Echiniformis' (4) — the prickly hedgehog juniper forms tight little 18- to 20-inch domes.

Juniperus squamata 'Blue Star' (4) — juniper 'Blue Star' forms foot-high spreading mats of steely-blue foliage.

PINE

Pinus mugo (3) — a fine, short-needed European mountain pine that makes an attractive accent in any garden. Among the good varieties are 'Gnome', 'Mitsch Mini' and 'Valley Cushion'.

Pinus parviflora 'Adcock's Dwarf' (5) — a short-needed Japanese white pine that lends itself to pot culture and is often used for bonsai.

SPRUCE

Picea abies 'Little Gem' (2) — a choice rock garden miniature, this bird's nest spruce forms tight little eight-inch buns.

Picea glauca 'Gnome' (2) — this dwarf Alberta spruce grows into dense cones no more than 20 inches high, making it highly desirable.

Picea glauca 'Echiniformis' (2) the hedgehog form of the white spruce is a slow-growing, blue-gray miniature.

Picea omorika 'Nana' (4) — a bi-colored charmer whose needles are green on the underside and blue on top, making this dwarf version of the regal Serbian spruce a real find.

Picea pungens glauca (2) — two good dwarf forms of the popular Colorado blue spruce, 'St. Mary' and 'R.H. Montgomery', are equally desirable.

ROCK GARDEN PLANTS

While rock garden plants don't demand rocks, they do demand perfect drainage. Almost all soil has to be altered to provide this for it is imperative that the plants' roots be able to absorb oxygen. If the soil is heavy, soggy clay, rock plants quickly become candidates for the compost heap.

A good basic soil mix for container growing consists of equal parts (by volume) top soil, peat moss, and a fine (#2 or #3) chicken grit. For plants that require a more alkaline growing medium, small amounts of



Iris gracilipes 'Alba' graces a clay pot backed by several hostas.

horticultural or dolomitic limestone (one tablespoon per bushel) will provide the needed calcium. These lime lovers are indicated by an asterisk (*).

Most rock plants will take full sun. A few, however, prefer part shade and are so indicated.

The following were chosen for ease of cultivation. Most of these plants will respond to basic gardening techniques, while some will challenge the expert — but therein lies the fun.

Aethionema 'Warley Rose', a named variety of Persian candytuft, is a long bloomer that covers itself with pink flower clusters in hot dry positions.

Aquilegia, the beloved columbine, offers many species to choose from. Among the choice rock varieties are *Aquilegia canadensis nana*, a native American dwarf form in red and yellow; *A. bertolonii*, a six-inch Italian gem of purest purple; and *A. saximontana*, a Rocky Mountain endemic with nodding blue and white flowers.

Arenaria montana, the mountain sandwort, is a classic European alpine with white cup-shaped flowers.

*Aster alpinus** serves up lavender to purple flowers in spring rather than fall.

Astilbe chinensis 'Pumila', a handsome pygmy of the genus, delights with clusters of silvery pink plumes that rarely top ten inches.

Campanula species, the enchanting bellflowers, deserve a place in every garden. There are hundreds to choose from, so check names carefully or you may end up with a four-foot surprise rather than the four-inch variety you expected. Some choice ones: *Campanula barbata*, with large one-and-one-half-inch pendant blue bells covered with downy hairs; *C. carpatica*, which forms low-growing mounds of blue or white cup-shaped flowers; and *C. garganica*, an ivy-leaved charmer from the Mediterranean, which explodes into a blanket of purple stars each spring. There are many more, with nary a bummer in the lot. Try many of them.

Chrysanthemum weyrichii produces lovely pink daisies that contrast nicely with the lacy black-green leaves of this sprawler.

Cotoneaster apiculata 'Tom Thumb', as the name suggests, is a splendid miniature

that will sprawl over a rock. It is much more accommodating than its thorny big brother.

Find a shady spot for *Cyclamen coum*, which will welcome spring with its shocking pink blooms. Its ivy-leaved form, *C. hed-erifolium*, will do the same each fall.

No garden should be without at least one of the dwarf daphnes. Try pink *D. arbuscula* or a white form, *D. cneorum pygmaea alba*, either of which will lure the unwary gardener with its seductive aroma.

From the ubiquitous pinks family, choose one of the dwarf varieties such as *Dianthus* 'Tiny Rubies' or *D.* 'Little Joe'. Also try some of the choice bun-forming species such as *D. microlepis* or *D. simulans*, whose foliage is like a miniature hedgehog until it suddenly blankets itself with bloom.

Dwarf members of the mustard family, the drabas, or whitlow grasses, cover themselves with sharp yellow blossoms at the first hint of spring. Try *Draba aizoides*, *D. hispica*, *D. oligosperma* or *D. rigida* — any one of which will chase the winter blues away.

Dryas octopetala, a mountain avens, endears itself to many with snow-white blossoms studded with yellow eyes borne over lush, black-green foliage.

Edraianthus pumilio, a member of the bellflower family, will please the most discerning eye with its uplifted lavender-blue bells over green tufts of grasslike leaves.

Erigeron alpinus, the alpine fleabane, cheers the soul with hordes of pink or white daisies.

The white form of fairy foxglove, *Erinus alpinus alba*, has long-blooming flower clusters over lacy green mats.

The incredible blue of gentians can lift the heart on the dullest day. There are dozens to choose from, many of them difficult to grow. Some worth trying are: *Gentiana scabra*, *G. septemfida* and *G. verna*.

Geraniums (not the tender windowbox variety, but the true cranesbill) bloom over a long period. *Geranium dalmaticum*, in

either its pink or white form, works magic in sun or part shade.

Also try the sensual, velvet-leaved *G. renardii*, with lovely lavender cups striped with the faintest purple. For a larger variety, look for the inimitable *G. wallichianum* 'Buxton's Blue'.

For a shady corner under shrub or tree, make room for our midwestern woodlander, *Iris cristata*, the crested iris, in either its purple or white form. Plant in rich woodland soil and watch it spread happily — a petite charmer of less than six inches. Leave room for a few clusters of *Iris gracilipes alba* to enchant everyone with white butterflylike blossoms nodding over a six-inch fountain of lettuce-green grasslike leaves.

Also consider the wonderful Japanese roof iris, *I. tectorum*, a beautiful variety whose blooms are less coarse than its long-stemmed, over-hybridized cousins.

One of the glories of the American West is *Lewisia cotyledon*, whose spring show of pink, candy-striped flowers is ever enchanting. A more diminutive relative, *L. pygmaea*, forms a three-inch high cluster of fleshy, fingerlike leaves studded with blooms of pink striped with carmen. More subdued in color, and absolutely ravishing when its apricot-flushed blooms open is *L. tweedyi*, the choicest and most difficult to grow of the lewisias.

Another indispensable family of western wildflowers is the penstemon genus. Also called the beard-tongues, they come in hundreds of varieties which offer many colors and sizes. Look for choice dwarf varieties such as *Penstemon davidsonii*, a low-growing creeper with purplish-blue flowers. *P. rupicola* grows a bit higher and covers itself with bubble gum-pink bloom when happy in hot, dry conditions with full sun. *P. hirsutus pygmaeus* is an easier to grow, well behaved low form with bicolored blooms of lavender and creamy white.

The dwarf phloxes are another American treasure. Forget the ubiquitous *P. subulata*



Chrysanthemum weyrichii produces lovely pink daisies and lacy dark leaves.

forms and search out *Phlox bifida* in either lavender or white. Its lacy blossoms look like intricate snowflakes. Also worthy is our native woodlander, *Phlox divaricata*, a bit taller at ten inches, with several choice lavender-blue shades, and a good white as well.


For shady nooks, nothing beats the incomparable primroses. Look for good color forms of *Primula auricula*, the bears' ear primrose. Or cluster a group of the drumstick heads of *P. denticulata* for instant eye-appeal. And don't forget the sharp yellow of *P. veris*, the cowslip, or another spring harbinger, *P. vulgaris*. Peaty, well drained soil promotes flowering in primulas.

The pasque flower, *Pulsatilla vulgaris*, blooms at Easter in a fine range of colors over a long period, and is interesting when its feathery seed pods waft in the breeze.

There are several distinct types of saxifrage, or rock-foil, each indispensable for gardeners. **Saxifraga* 'Peter Pan' is a choice "mossy" saxifrage, which forms mats of lacelike leaves topped by hordes of yellow-centered white flowers, each petal tipped in hot pink. The encrusted saxifrages have spatulalike silvery leaves that

are ringed with white, almost as if they'd been frosted. **S. callosa* or **S. paniculata* are two choices that are stunning even when not in bloom, which is fortunate, for when one of the many rosettes does bloom, it dies. The more experienced grower will seek out some of the incomparable porophyllum saxifrages which form tight little buns of hard foliage and colorful riots of flowers each spring, enchanting everyone. Be forewarned, however, they are difficult, and expensive. Most of them prefer lime, partial shade and perfect drainage.

A final favorite is the common house-leek, *Sempervivum*, sometimes called "live forever." There are hundreds of these rapid spreaders to choose from. One sure favorite is *S. arachnoideum*, with each of its rosettes cobwebbed as if by some industrious cosmic spider.

To find some of these plants, you may have to search out nurseries that specialize in rock garden plants. Do make the effort for these alpine gems and dwarf conifers will help you achieve that oh-so-special garden. 

TRY ROSE PETALS & HIBISCUS BLOSSOMS FOR DINNER

BY ROBERT BEALE

How about a rose-petal sandwich, or a cup of lavender tea for lunch? Or for a snack, what about nasturtium pastry, followed by basil blossom ice cream? Certainly this is nothing new, since edible blooms have a long history of kitchen use, not only for decoration but for eating candied, pickled, sauteed or dried. They're an essential part of my eleventh floor rooftop scene and I grow them right alongside my herbs and small vegetables. Which means old roses with basil and chives, and calendula tucked among tomatoes, beans and peas.

One of my favorites is squash blossoms. I enjoy them stuffed with rice, cheese or meat or sauteed in butter or sesame oil. And to add a yellow hue to rice use calendula blossoms. It's true they don't have saffron's flavor — but they also don't cost as much. Daylilies, too, are popular fare; buds, blossoms and roots are edible.

I add rose petals to lightly buttered bread for a tea-time treat. Add nasturtium blossoms and leaves to salads. For flavor and fragrance try blossoms of hibiscus, Johnny jump-ups, pansies, calendula and the petals of roses — the antique ones are

best. Remember, the more colorful the bloom, the more colorful the dish.

Another favorite is the scarlet runner bean. This is a quick growing vine with lusty foliage and beautiful, tasty blooms. The bean itself is delicious, and adds zip to soups and casseroles.

The blossoms of many culinary herbs are edible, too. I am especially partial to chives, and use both the flowers and leaves in salads. Both basil blooms and leaves will add a tangy garnish to pastas, and mint flowers will float picturesquely in tea.

Fresh flowers, artfully arranged, brighten any dessert. Candied blossoms of violets and roses are standards for cake decoration and they're easy to find or make at home. The leaves of anise hyssop and scented geraniums are also useful fresh or candied. And try whorls of sweet woodruff or the purple flowers of mint as a topping on mousses and cakes.

Gather the flowers to be used in cooking early in the morning. Wash them gently and store them in the refrigerator, flattened between layers of wax paper or paper towels. Only flowers you expect to use dried should be picked in the heat of the day.



ROBERT BEALE

Squash flowers can be stuffed or sauteed in butter or sesame oil.



The flowers of garlic chives are also edible.



Eggplants and tomatoes can be grown in pots but require full sun.

EDIBLE FLOWERS

Keep in mind that not all blossoms or leaves are tasty — or even safe. The flowers of four o'clocks (*Mirabilis jalapa*) and sweet peas (*Lathyrus odoratus*) are among the many that are poisonous and some parts of edible plants are toxic, too — such as tomato and rhubarb leaves. Stick to the following list and you'll be safe. Do not experiment in the kitchen.

Remember, too, never use chemicals on what you plan to eat. Also avoid florists' flowers for they may have been sprayed.

Here is a sampling of edibles to grow and harvest in even the smallest garden.

- Anise hyssop (*Pimpinella anisum*)
- Borage (*Borago officinalis*)
- Carnation (*Dianthus caryophyllus*), (*D. x allwoodii*, *D. alpinus*, *D. plumarius* 'Spring Beauty')
- Camellia (*Camellia japonica*)
- Chrysanthemum (*Chrysanthemum* spp.), (*C. parthenium*, *C. frutescens*, *C. coccineum*)
- Chives (*Allium schoenoprasum*)
- Citrus (including lemon, lime and orange blossoms) (*Citrus* spp.)
- Dandelion (*Taraxacum officinale*)

Daylily (*Heemerocallis* spp.) (*H.* 'Stella d'Oro', *H.* mixed hybrids)
 Gardenia (*Gardenia jasminoides*)
 Gladiolus (*Gladiolus callianthus*)
 Hollyhock (*Alcea* spp.), (*A. rosea* 'Powder Puffs')
 Jasmine (*Jasminum* spp.)
 Lavender (*Lavandula* spp.), (*L. angustifolia* 'Hidcote', *L. a.* 'Jean Davis')
 Marigold (*Tagetes* spp.)
 Mint (*Mentha piperita*)
 Pansy (*Viola x wittrockiana*)
 Passion flower (*Passiflora* spp.)
 Pot marigold (*Calendula officinalis*)
 Rose (*Rosa* spp.) (*R. rugosa*, *R. gallica*, *R. mundi*, *R. damascena*)
 Scarlet runner bean (*Phaseolus coccineus*)
 Summer squash (*Cucurbita pepo*)
 Sweet woodruff (*Galium odoratum*)
 Violet (*Viola odorata*)

Arranging vegetables and herbs in a small space means taking some time first to determine the days needed from seed to maturity, as well as the spacing for good development of each plant. Not every town or city gardener has ideal conditions for starting seeds on windowsills indoors — ideal meaning a full day of sun. So if you plan on starting plants from seed make your selections carefully, or concentrate on varieties that can be sown directly outside after the last frost. I find that soaking seed in a tea solution increases germination by 25 to 30 percent. You'll find that, unlike flowers, vegetables and herbs nearly always grow true from seed.

Many small space gardeners find it's better to wait until later in spring, and purchase flats of nursery grown seedlings to transplant. So even if you started with seed and were not successful, you can start again. And try growing from seed again next year.

Both herbs and vegetables need a porous, well draining soil. In general, veg-

etables prefer soil that is slightly acid (pH 6.0 to 6.8) and rich in such organic matter as compost and cow manure (bags of both are available at most garden centers). A handful of bone meal should also be added to each container or per square foot of soil. I like to think of it as a soil conditioner.

Regular feeding is needed throughout the growing season, especially for crops grown in containers (and remember that the bigger the container, the less feeding and watering will be necessary). The three numbers on the fertilizer package denote the proportion of nutrients included, in order. These are nitrogen, phosphorus and potassium. As a rule of thumb, use a high nitrogen fertilizer, such as fish emulsion, for leafy crops like lettuce and a high phosphorus fertilizer, such as bone meal, for crops that set flowers like tomatoes or squash. Follow directions on the package until such time as you can better determine just how often to use fertilizers. You don't want to use too much and take a chance of burning your plants.

Herbs, however, typically are best in a less acid and less rich soil with minimal feeding. If you can, spray all plants with a hose at least twice a week; make sure you do it before the sun is up, or after sun-down. You can also fertilize with a foliar spray, such as liquid kelp, once every two weeks.

In any case, plan on rotating your crops. Don't plant the same vegetables or herbs in the same containers or same part of your garden each year. Pretend you're a farmer and aim for a three-year rotation system, at least.

Here is a sampling of vegetables and herbs for the small town and city garden.

VEGETABLES FOR FULL SUN

Arugula (*Eruca sativa*)
 Beans (*Phaseolus vulgaris*)
 Broccoli (*Brassica oleracea*)



A large strawberry jar is a perfect container for a plethora of herbs.

Cabbage (*Brassica oleracea*)
 Carrots (*Daucus carota*)
 Cauliflower (*Brassica oleracea*)
 Celery (*Apium graveolens*)
 Cucumbers (*Cucumis sativus*)
 Eggplant (*Solanum melongena*)
 Endive (*Cichorium endivia*)
 Leeks (*Allium ampeloprasum* var. *porrum*)
 Onions (*Allium cepa*)
 Peas (*Pisum sativum*)
 Peppers (*Capsicum annuum*)
 Radishes (*Raphanus sativus*)
 Spinach (*Spinacia oleracea*)
 Summer squash (*Cucurbita pepo*)
 Tomatoes (*Lycopersicon lycopersicum*)

VEGETABLES FOR PART SHADE

Lettuce (*Lactuca sativa*)
 Spinach (*Spinacia oleracea*)

HERBS FOR FULL SUN

Coriander (*Coriandrum sativum*)
 Dill (*Anethum graveolens*)
 Marjoram (*Origanum vulgare*) (*O. marjorana*)
 Rosemary (*Rosmarinus officinalis*)
 Sage (*Salvia officinalis*)
 Tarragon (*Artemisia dracunculus*)
 Thyme (*Thymus vulgaris*) (*T. serpyllum*)

HERBS FOR PART SUN

Angelica (*Angelica archangelica*)
 Basil (*Ocimum basilicum*)
 Bay (*Laurus nobilis*)
 Chervil (*Anthriscus cerefolium*)
 Chives (*Allium schoenoprasum*)
 Mint (*Mentha piperita*)
 Parsley (*Petroselinum crispum*)



THE TAILORED GARDEN

TOPIARY FOR SMALL SPACES

BY DEBORAH REICH

Topriary, the training and shaping of plants, is a traditional art that is coming alive again in small gardens. Among the most ancient of gardening arts, topiary has always had its humorous aspect. From Pliny the Younger's ancient Roman villa, where he spelled out his name in clipped boxwood, to the Pennsylvania gardener who turned a juniper into a rabbit, people have used topiary to keep plants attractive — and interesting — within a carefully allotted space.

Types of Topiary

There are many types of plant shaping, both ornamental and utilitarian, that are useful for the limited areas of city gardens. One is the *espalier*. These two-dimensional, vertical designs take up almost no space on the ground, and can be grown in a bed or container one foot wide. Espaliers are invaluable for transforming walls or enlivening fencing, even though they were originally developed for fruit trees in medieval walled towns. There are many formal designs that date to French fruit-growing techniques, including the candelabrum-

shaped *Palmette Verrier* or *Palmette Oblique*.

Espaliers can also be grown on free-standing supports as living fences or diamond lattice screens, known, respectively, as horizontal cordons and Belgian fences.

Freestanding espaliers will conceal a utility area or block a neighbor's gaze without closing off the garden from light and air.

Informal espaliers are a modern American version. These are inspired by a more Oriental look in plant training, and simply stylize the habit of a mature plant. Often one finds a plant in the garden or nursery that has been storm damaged or crowded by its neighbors; a bit of thinning and pruning of projecting branches will create a flat, free-form design.

Knot gardens are composed of miniature hedges that intertwine in patterns. These are especially attractive when viewed from above, making them perfect for courtyards, townhouse gardens or just beyond a picture window or glass door. Fragrant herbs are the plants traditionally used in knot designs. Use different species with contrasting foliage texture and color to highlight the pattern; gray santolina or laven-



Upright junipers are good candidates for topiary. They are tolerant of smog, shade and wind.

der, green boxwood and reddish 'Crimson Pygmy' barberry are an especially attractive trio.

Knot patterns were enlarged and adapted as sinuous, curving designs in French gardens and known as *parterres*. If knots or parterre designs are planted with dwarf, slow-growing plants, they won't need frequent shearing. The spaces between the lines can be covered with landscape fabric to prevent weeds and then topped with a decorative fine-textured mulch such as crushed stone, bark or coal.

A *hedge* is the basic building block of architectural topiary, and the backbone

of many successful landscape plans. A row of shrubs or trees evenly spaced and trimmed into a solid line, it can have curved or straight sides but should be wider at the base than the top. This keeps the upper portion from shading the bottom and causing gaps that are as unsightly as missing teeth in a smile.

If you are lucky enough to have a garden with an existing hedge, there are several ways to make it more interesting. Buttresses can be trained to project from the hedge and frame a long border into separate landscape pictures. Windows can be cut to frame views without sacrificing shel-

RECOMMENDED PLANTS FOR TOPIARY

TOPIARY CODE: e=espalier; k=knot; h=hedge; s=sculptural; st=standard; p=portable

Alberta Spruce — *Picea glauca albertiana* — s,st

The fine gray-green needles and naturally conical habit make this plant easy to train into cones, spirals, pointed standards and tiered geometric shapes.

Apple/Pear — *Malus* cv., *Pyrus* cv. — e

Fruit trees are easily trained into espaliers, starting with an unbranched "whip." Look for disease-resistant varieties to minimize spraying.

Boxwood — *Buxus sempervirens*, *B. s. suffruticosa*, *B. microphylla koreana* — k, h

A classic plant with small, rounded shiny leaves, slow growing and compact. Dwarf edging boxwood and Korean boxwood are good for knot gardens.

English Ivy — *Hedera helix* — e,k,p

More than 400 varieties plus a hardy nature and good growth habit make this plant useful for many kinds of topiary.

Eugenia — *Syzygium paniculatum* — h,s,st

Also called Australian brush cherry, an excellent, glossy reddish leaved plant for Florida, California and Hawaii, with attractive white flowers and purple fruits.

Hemlock — *Tsuga canadensis* — h,s

Sheared hemlock has a velvety appearance. Because of its stature, it is suitable for larger hedges, arches and sculptures.

Hornbeam — *Carpinus betulus* — h

Elegant arches and stilt hedges can be formed from these trees; leaves turn brown but remain all winter.

Juniper — *Juniperus* spp. & varieties — s

The many varieties of upright, rather than spreading, juniper, vary in color from gray to deep green and have a columnar habit useful for spirals and other narrow shapes. Tolerates smog, shade and wind.

Privet — *Ligustrum japonicum*, *L.*

lucidum, *L. ovalifolium*, *L. vulgare* — h,s

Small oval leaves cover a fast-growing plant which will recover quickly from pruning mishaps. It may need shearing every other week in the summer and loses its leaves in winter.

Pyracantha — *Pyracantha coccinea* — e,h,s

Semi-evergreen with attractive flowers and berries. A fast grower for espalier.

Yaupon — *Ilex vomitoria* — h,s,k

In southern areas where summers are hot and boxwood will not thrive, this densely textured native plant is an excellent substitute. Use the dwarf form for knot gardens.

Yew — *Taxus baccata*, *T. cuspidata*, *T. x media* — e,h,s

Dark green, fine-needled texture responds well to severe pruning and shearing.

ter. Long shoots along the top can be trained into sculptural or geometric shapes ranging from swans to finials.

Allow the hedge to be thicker and taller at intervals, forming columns or corner piers, or use a shrub of contrasting color as a terminus. Gold yew (*Taxus cuspidata* 'Aurescens'), for example, has the same requirements as the green variety but adds an element of drama.

Another architectural technique is known as *pleaching*. Branches of adjoining trees are woven together to form a solid wall or canopy. This can be done with trees on either side of a path or gate to create a romantic archway. *Stilt hedges* are rows of trees with smooth trunks and heads cut to form an aerial hedge. These make it possible to add a framework of green without giving up ground. Where zoning restrictions limit the height of walls and fences, a stilt hedge along the boundary adds an additional measure of privacy.

But the topiaries that really excite the imagination and sense of humor are surely the *sculptural* pieces. These may be as sober as obelisks marking an entranceway, or as amusing as hippos dancing across a lawn. Shrubs that are suitable for shearing into hedges will also work for sculptures. You can start with a young plant, either shaping it by eye or aided by a metal frame. Sometimes the form of an established specimen suggests a subject: a split-top upright arborvitae becomes a rabbit, a spreading yew a frog. Like a hedge, a freestanding topiary should taper towards the top, so that light reaches all portions of the figure and snow loads don't break its branches.

Since a living sculpture requires regular attention over the years, it must be a labor of love, more a mode of artistic expression than a chore. This is a long-term project; the first year the basic shape will be

DEBORAH REICH



For topiary spirals consider junipers, which vary in color from deep green to gray.

achieved, but the details and refinements emerge in subsequent pruning sessions. Metal frames have been used for centuries and speed the process along. They are invaluable trimming guides for timid pruners and make it easier to tie branches in the appropriate direction or in complex shapes.

Portable Forms

For temporary effect or instant gratification, there are the portable topiaries. The familiar lollipop topiary is correctly known as a *standard*. A simplified tree shape, it is a single stem plant with a crown of growth at the top. Early engravings show that tubbed standards trained from citrus and herbs were used seasonally to decorate small formal gardens.



LINDA YANG

With judicious pruning, *Pinus densiflora* 'Umbraculifera' becomes a living sculpture. A mature specimen has beautiful orange bark.

Many nonhardy plants can be trained into standards, and used outside during the summer. Lantana, fuchsia, geranium and heliotrope make lovely flowering trees, while such herbs as rosemary, bay, and myrtle are appreciated for their scented foliage. They add height to flat designs, and are traditionally displayed in pairs on either side of an entrance as a sign of welcome. Standards are an excellent complement to the most ornate or elegant pots and planter boxes.

Metal frames make it possible to quickly achieve simple potted shapes. Vining plants such as ivy can be planted in a pot and twined or tied to a metal frame. Spirals, cones and multitiered geometric shapes are good candidates for this technique. But even more versatile is the *stuffed topiary*, where the frame, which is filled with moss, serves as the growing container for plants. Eliminating the pot means greater freedom in display and faster coverage of the shape, since the plants are on the surface of the form. It is important to remember that smaller and upper portions dry out quickly so plant in the fatter or lower sections only. Then train vining plants to cover the sur-

face by anchoring their stems with hairpins or fern pins.

Like standards, these may be too delicate to thrive outdoors during cold winters, especially on a windy balcony or roof garden. Either move them indoors, or store the form in a closet or garage and replant it anew each spring with rooted cuttings or young plants. Ivy and miniature euonymus are fast-covering vines, but don't overlook succulents or sedums for hot, dry locations.

Basic Care

Look after your topiary as you would any shrub subject to the stresses of growing in a restricted planter or urban setting. Well prepared soil is essential for lush, beautiful topiaries, whether they are in the ground or in containers. Weeds and lawn should be kept away from the roots, which should be protected with a light layer of mulch. Do not feed outdoor topiary after midsummer. Late feeding stimulates tender growth which might be damaged by frost. Be sure, too, to remove any leaves or branches that fall on your topiary in autumn or after storms.

Two juniper topiary poodles are the spectacular centerpieces of the Pennsylvania Horticultural Society's urban garden.

LINDA YANG




Pruning

Pruning is one of those mysterious subjects that becomes crystal clear once you've mastered the basic principles. Properly carried out, pruning stimulates and directs growth. Look at the area where the branch meets the leaf — you will see a dormant bud nestled between. If the branch tip is cut, these shoots sprout new leaves and form side twigs. Make cuts on a slant in the direction you want the new branch to grow, just above the leaf bud.

There are two types of pruning: structural and shearing. In structural pruning, larger branches are shortened or removed to establish or regain the desired shape. Shearing is the overall removal of surface shoots so the topiary keeps its dense coat of leaves. The best time to shear a hedge or topiary, a garden adage says, is when the gardener finds the time. Extensive structural pruning, however, is best done during the dormant season or just before shoots appear in spring. The exception is fruit espaliers, which should be pruned in summer to channel the plants' energy away from vegetative growth and into fruit production.

While standards may appear to be the most sophisticated horticultural creations, they are also created from basic pruning techniques. Start with a plant with a strong central stem, known as a leader. When the leader reaches the desired height, pinch out the top to encourage side branches to form a head. Once the head has developed, remove the lower branches.

Trained plants usually need to be tied to a frame, stake or support, especially in the initial stage. It is critical to remember that stems increase in diameter as they gain height and age, so all ties should be checked to avoid girdling, or strangling, trunks and branches. This can cause permanent tissue damage and often loss of limb. Use natural materials such as twine and raffia, so that if a tie is forgotten it may rot before it girdles the branch. Wire should never be used, and plastic and wire twist ties should only be temporary measures.

For topiary inspiration, unleash your imagination and study old garden prints — Europeans have stylishly coped with cramped gardens for centuries. Even a single topiary can transform a small garden into a magical spot. 



The poetic silhouette of a weeping mulberry against a blue, cloud-studded sky.



LINDA YANG

BEAUTIFUL WEEPERS

SMALL WEEPING TREES FOR SMALL GARDENS

BY LINDA YANG

Weeping trees — plants whose limbs grow down, not up — are spectacular sculptures in winter and graceful accents in summer. Take, for example, the 150-year-old weeping Camperdown elm in Prospect Park, Brooklyn. It's a mere 12 feet high, but its intricate pattern of branches etch a 25-foot circle.

"What a glorious silhouette it is against the winter sky — it's like no other tree or abstract work of art," said Robert Makla, who, with his fellow members of Friends of Prospect Park, has raised over \$15,000 to keep this treasure alive. "It is, after all, irreplaceable," he said. And so this tree has been fertilized, cleaned and pruned with regularity, and wired with steel cables to keep its massive limbs from snapping under the weight of ice and snow.

BEAUTIFUL WEEPERS FOR SMALL SPACES

EVERGREEN

- Weeping Alaskan or Nootka false cypress (*Chamaecyparis nootkatensis* 'Pendula')
- Weeping American arborvitae (*Thuja occidentalis* 'Pendula')
- Weeping blue spruce (*Picea pungens* 'Glauc Pendula')
- Weeping blue Atlas cedar (*Cedrus atlantica* 'Glauc Pendula')
- Weeping white fir (*Abies alba* 'Pendula')
- Weeping eastern white pine (*Pinus strobus* 'Pendula')
- Weeping Sargent hemlock (*Tsuga canadensis* 'Pendula')
- Weeping Serbian spruce (*Picea omorika* 'Pendula')
- Weeping white fir (*Abies alba* 'Pendula')

DECIDUOUS

- Weeping birch (*Betula pendula* 'Gracilis' or 'Youngii')
- Weeping Camperdown elm (*Ulmus glabra* 'Camperdownii')
- Weeping flowering crabapple 'Red Jade' (*Malus* 'Red Jade')
- Weeping Japanese dogwood (*Cornus kousa* 'Pendula')
- Weeping golden chain (*Laburnum alpinum* 'Pendula')
- Weeping Katsura (*Cercidiphyllum magnificum* 'Pendulum')
- Weeping pussy willow (*Salix caprea* 'Pendula')
- Weeping Siberian pea (*Caragana arborescens* 'Pendula')
- Weeping white cherry 'White Fountain' (*Prunus* 'White Fountain')

While not every weeper lives long enough to become such a venerable and treasured presence, even a young plant adds distinction to a tiny garden space. When pendulous plants are considered, it's the weeping willow that first springs to mind. But this is a rapid grower that quickly grabs more than its fair share of space. So unless you have acres to spare, the weeping willow is a tree to avoid.

The weepers to use instead are the slower growers or those more easily controlled with pruning. Since the vertical growth of such trees is limited — from two to fifteen feet, depending on the species — these are the plants for small town or city gardens. These are also the plants for patio, balcony or terrace containers, especially when ceiling height is restricted.

When I began wondering why a plant becomes pendulous or drooping in the first place, I turned to Peter Del Tredici of Boston's Arnold Arboretum, who had been so smitten by what he called the "mystery of Sargent's weeping hemlock" that he spent several years studying this species. "Actually, we don't know quite why it happens," he said, "but the weeping form is a mutation." What we do know, he added, is that most plants have a single growing point that remains dominant so that the whole trunk grows vertical and straight.

In weeping trees, this control mechanism is somehow disrupted. "Instead of developing an upright trunk from a vertical growing shoot, weeping trees develop by superimposing one layer of horizontal growth on top of the previous one," he



A weeping birch grown in a large container can grace a patio, balcony or terrace.

said. This horizontal growth pattern is called plagiotropism.

There are many outstanding evergreen and deciduous weeping plants from which to choose. Among the most easily grown of the evergreens is the weeping blue Atlas cedar. This exquisite member of the pine family bears its clusters of silvery blue needles along sinewy, flexible limbs. Allow its drooping boughs to trail outward, as they grow naturally, or loop them around in a corkscrew shape or stretch them horizontally so the young branchlets hang to form a thin curtain.

The weeping flowering crabapple, *Malus* 'Red Jade', a handsome, deciduous plant that adds several seasons of color to the scene, was developed from seed in 1933 by Brooklyn Botanic Garden. Its pale pink spring flowers and brilliant red fall fruits are

borne along gracefully drooping limbs.

"A weeping tree is a piece of sculpture — they're not plants to crowd," noted Daniel Taylor, Vice President of Rosedale Nurseries Inc, in Hawthorne, New York, which carries an extensive selection of weeping plants. So whatever weeper you choose, give it the space it deserves — a corner to itself — or position it where it's set off against a lawn or contrasting ground cover.

Among the weeping trees Mr. Taylor is partial to is Young's weeping birch with its white-barked trunk and irregular pendulous limbs, and the weeping Katsura, which has silvery bark and heart-shaped leaves that are reddish-purple when young. Also outstanding, he said, is the evergreen weeping Alaskan or Nootka false cypress, a fairly rapid grower that has an upright

Careful pruning can give a crabapple, a good choice for a small city garden, a weeping habit.



stem but distinctly pendulous limbs.

Although the effect may be similar, in fact there are different kinds of weeping plants. Trees like the weeping hemlock or weeping beech, for example, generally grow on a trunk that is naturally pendulous. On the other hand, trees like the weeping Camperdown elm or weeping spruce were artificially created by grafting a naturally drooping variety onto the straight stem of an upright form of the same genus. This form is called a standard.

The graft union for the weeping portion of a standard may be as low as a foot off the ground — which is where it is on the Prospect Park Camperdown elm — or as high as six feet. And so weeping plants of the same species may have markedly different appearances.

Despite their naturally horizontal growth pattern, pruning is needed by weepers for size control, as well as appearance, said Scott S. Jamison, President of Oliver Nurseries in Fairfield Connecticut, where weeping plants are also much in evidence. And since in winter tree form is most clearly seen, that's the time to prune. The 'Red Jade' crabapple, for example, if left unpruned, will reach a height of about 18 feet, and its branches will extend over a 35 foot circle. But regular pruning will keep the tree comfortable in a much smaller space.

"When you prune a weeping plant it's important to accentuate the cascading form and avoid creating a moplike head," Mr. Jamison said. "Do this by removing crossing branches first. Then, thin the plant by trimming several limbs from around the area closest to the trunk." Tall growers or spreading plants are kept in bounds by removing several outside branches as well.

Among the evergreens he recommends for small spaces are the weeping white fir, which has rich evergreen needles and silvery-gray bark, and the weeping blue spruce, which has blue-green needles. The weeping cherry 'White Fountain' is a deciduous plant that's also a slow grower. Although it may eventually reach 15 feet in height, its pendulous limbs tend to remain within a compact diameter of about six feet.

"In the forest, plants survive by growing up toward light," said Mr. Del Tredici. "This means that in the wild, plants with horizontal growth are easily wiped out. Weeping plants are actually maladapted for survival under such conditions." Clearly, such glorious trees belong in a planned garden where they can be seen and properly savored.

Adapted from *"Trees that Droop Ever so Sculpturally,"* by Linda Yang, which first appeared in The New York Times, February 1, 1990.

XERISCAPE COMES TO TOWN

BY VIRGINIA STRATTON

As early as 1921, Florence Yoch designed a garden with drought-resistant plants and species native to her Texas home. At the time this was a rather radical idea. Sixty years later, however, the entire country recognizes that we must manage water wisely. Gardening which uses water spar-

ingly is often known as xeriscaping. Xeriscaping is not so much a new kind of gardening as it is good gardening with a new emphasis. Its primary concern is the conservation of water.

Xeriscaping has seven, easy-to-understand concepts.

Planning & Design Your garden should



This lush, spectacular rock garden was created using plants that need remarkably little water.

PLANTS FOR WATER-THRIFTY GARDENS

Name	Zone
<i>Acer ginnala</i> (Amur maple), <i>A. platanoides</i> (Norway maple) ..Tree	4-9
<i>Achillea ptarmica</i> 'The Pearl' (Yarrow) <i>A. millefolium</i> , hybrids & cvs....Perennial.....	4-10
<i>Arctostaphylos uva-ursi</i> (Kinnikinnick)	Groundcover.....3-7
<i>Arrhenatherum elatius bulbosum</i> (Bulbous oat grass)	Grass
<i>Artemisia</i>	Perennial
<i>Atriplex canescens</i> (Saltbush)	Shrub.....
<i>Belamcanda</i> (Blackberry lily)	Perennial.....
<i>Bouteloua gracilis</i> (Blue grama grass)	Grass
<i>Briza media</i> (Quaking grass)	Grass



Several water-thrifty *Sempervivum* species spill out of a strawberry jar.

LAWRENCE THOMAS

begin with a site study. Whether it's a tiny balcony or spacious rooftop, a sunny front space or shaded back, the goal is to group together plants of like water needs. Make a note of places where run-off occurs — perhaps near a downspout — and turn it to good use by putting thirstier plants here. This is the time to consider how much (if any) lawn you need, and how it will be used. A wooden deck, stone patio or a path leading to a quiet corner can replace unused lawn nicely, and is oh, so much easier to care for. Consider using these turf alternatives in areas where nothing will grow, and include garden sculpture and container plants. Raised beds or terraces create visual interest and can also be designed to channel water to control run-off. If drying winds are a problem, plant a windbreak, which also lessens soil erosion.

Water-conserving irrigation. Next, incorporate a water-thrifty irrigation system in your garden plan — an underground drip, bubble or sprinkler design, for example. Since you've grouped your

<i>Buddleia alternifolia</i> (Fountain buddleia)	Shrub	6-8
<i>B. davidii</i> (Butterfly bush)	Shrub	5-9
<i>Callirhoe</i> (Poppy mallow)	Perennial	4-8
<i>Caragana arborescens</i> (Siberian pea tree)	Shrub	2-7
<i>Celtis</i> (Hackberry)	Tree	3-9
<i>Centaurea</i> (Mountain bluet, Bachelor's button)	Annual/Perennial	4-8
<i>Cosmos</i>	Annual	3-9
<i>Cotoneaster horizontalis</i>	Groundcover	5-9
<i>Crataegus crus-galli</i> (Hawthorn)	Tree	5-9
<i>Dianthus</i> (Garden pink)	Groundcover	4-10
<i>Eryngium maritimum</i> (Sea holly)	Perennial	5-10
<i>Gazania</i>	Annual	5-9

continued on page 80

plants according to water needs, the system can be used to direct moisture only to areas that need it, and in the right amounts. Such watering encourages deeper, stronger root growth and, as a result, greater drought tolerance. It also eliminates overwatering, which weakens plants. In addition, correct watering reduces the leaching of nutrients from the soil, and promotes good pore space for oxygen.

Soil improvement. All this planning will be for nothing unless you improve your soil before anything goes into the ground. Improved soil is fundamental to good water penetration and storage. Because chemicals can reduce the activity of beneficial soil organisms, good organic compost is best. This is especially important in the small garden, where chemicals accumulate quickly. Dig down deep as you add the compost; a deep, spreading root system also resists drought stress.

Limited lawn use. If you must have a lawn, keep it close to the house. Make sure you choose the best exposure; eliminate

LINDA YANG



Cosmos, potentilla and honey locust are water-conserving choices for a rooftop garden.

PLANTS FOR WATER-THRIFTY GARDENS

continued from page 80

<i>Gleditsia triacanthos</i> (Locust)	Tree	5-9
<i>Hemerocallis</i> (Daylily)	Perennial	3-10
<i>Ilex vomitoria</i> (Yaupon)	Groundcover	7-10
<i>Iris</i> , German bearded	Perennial	2-7
<i>Juniperus</i> (Juniper)	Tree, Shrub, Groundcover	3-9
<i>Kniphofia</i> (Torch lily, red hot poker)	Perennial	5-10
<i>Koelreuteria paniculata</i> (Goldenrain tree)	Tree	5-8
<i>Liatris spicata</i> , <i>L. scariosa</i> 'Alba'	Perennial	2-9
<i>Limonium</i> (Statice)	Perennial	4-10
<i>Linum</i> (Flax)	Perennial	5-10
<i>Mahonia</i>	Shrub, Groundcover	5-10



Perovskia atriplicifolia, Russian sage,
is a water-thrifty perennial.

LAWRENCE THOMAS

lawn elsewhere, especially on slopes and narrow spaces. These are the places for your favorite ground cover or a rock garden. Although the search for the perfect grass cultivar is never ending ("a triumph of hope over experience" as Dr. Johnson said in another context) there are several new hardy and disease-resistant varieties. Your local water authority can recommend the grass or grass blend best suited to your climate. Read one of the many excellent books on lawn care. Your improved soil will encourage the deep root growth that keeps grass going through a drought. And don't overuse fertilizer. We now know that grass uses nitrogen so efficiently that applying lots of high-nitrogen fertilizer has an adverse effect, creating lazy, shallow roots and poor water absorption.


Mulching. Even the best soil is subject to drying, heaving and compaction, which are stressful to plants. Like people, plants can tolerate a few stressful experiences but not a run of them. Mulching reduces these

<i>Morus alba</i> (White mulberry)	Tree	5-9
<i>Papaver orientale</i> (Oriental poppy)	Perennial.....	4-9
<i>Perovskia atriplicifolia</i> (Russian sage)	Perennial.....	3-8
<i>Picea glauca</i> (White spruce)	Tree	3-6
<i>P. engelmannii</i> (Engelmann spruce)	Tree	2-5
<i>Pinus mugo</i> (Dwarf mountain pine)	Shrub	2-7
<i>Pinus thunbergii</i> (Black pine)	Tree	4-8
<i>Potentilla</i>	Shrub	4-10
<i>Rosa foetida</i> 'Bicolor' (Austrian copper rose)	Shrub	5-10
<i>R. rugosa</i> (Rugosa rose).....	Perennial.....	3-10
<i>Salvia sclarea</i> (Clary sage)	Perennial.....	5-10
<i>Trachymene</i> (Blue lace flower).....	Perennial.....	5-9
<i>Yucca glauca</i> (Soapweed)	Perennial.....	5-10

stresses as it reduces changes in soil temperature and keeps roots from freezing. Whether you choose an organic mulch that breaks down or an inorganic one that doesn't, be sure it allows good water penetration. A good mulch also inhibits weed growth. Apply organic mulches about six inches thick; four inches will do for inorganic ones.

Maintenance. Deep, frequent watering will be necessary until your plants are established. Usually, one year is enough; sometimes two years of attentive watering are needed. Learn what is recommended for the species you have chosen. Since sprinkler systems lose up to 70 percent of their output in evaporation on a dry windy day, water between midnight and sunup. Remember, too, to turn off your system when it rains, and adjust it seasonally.

Low-water-use plants. Drought-resistant plants native to arid and semi-arid climates are best suited to California, the Desert Southwest and other very dry

regions. More humid areas will require their own lists of appropriate plants. The accompanying plant list should be seen only as a starting point. The water needs of even these drought-tolerant plants vary widely. For a more precise list of plants specifically for your area, consult The National Wildflower Council, or a state branch, the botany department of a nearby state university, or your local botanic garden. For general information on water-wise gardening, write the National Xeriscape Council. 

THE NATIONAL XERISCAPE COUNCIL, INC.
P.O. Box 767936
Roswell, GA 30076-7936

THE NATIONAL WILDFLOWER RESEARCH CENTER
2600 FM973 North
Austin, TX 78725
Include \$3 for shipping and handling.

DIVIDE AND CONQUER

WITH ARBORS AND TRELLISES

BY WILLIAM C. MULLIGAN



An arbor becomes a focal point in an informal garden.

Airy, simple structures of wood and other materials lend a degree of enchantment to the town or city garden that far outweighs the effort or expense. Arbor arches, fences, pergolas (criss-crossing beams supported by columns), seating alcoves, even mini gazebos, bring order to what might otherwise seem a meaningless jumble of plants. As decorative focal points in even the tiniest of plots, these fabrications draw the visitor into the garden and extend an invitation to linger and appreciate the gardener's labors.

And this is to say nothing about practicality. By definition, balconies, terraces and rowhouse gardens invariably challenge their owners to get the most from the smallest spaces. Arbors and dividers may be just what the doctor ordered to solve the most vexing problems of spa-

tial confinement. I am a fan of lattice-work and rely on the medium frequently in my own designs. It's been a staple of gardens from the time of Louis XIV (when it was called treillage), in no small part because of its ability to perform many functions simultaneously. Besides adding decorative charm, a lattice wall or fence shelters the garden from harsh winds, ensures privacy from neighbors and vertically showcases rambling branches and vines.

A crucial advantage of lattice is its ability to create the illusion of greater space. For example, the wooden laths can be aligned so they appear to be radiating from a disappearing perspective. Apply the design to a blank wall at the end or sides of the garden, and the space magically extends itself, even more so if a mirror is added.



A lattice wall adds decorative charm, shelters the garden from harsh winds, ensures privacy and showcases rambling and climbing plants.



This lattice construction, complete with finials and arched door, creates an inviting entrance to the garden.

A number of years ago, a friend rescued some ancient, discarded lattice from the sidewalk outside her townhouse. Piecing it together, she discovered a trompe l'oeil design which she backed with a mirror, and then applied to an overwhelming brick wall at the end of her French-style garden. The wall was softened and the garden visually extended by twice its size.

Soon after, a next-door neighbor installed an unsightly stockade fence between his yard and hers. To minimize the

WILLIAM MULLIGAN

fence, my friend whitewashed it and I constructed a series of four-by-six-foot diamond-pattern lattice panels. These were painted blue-green and hung on nails driven into the fencing. The effect was miraculous — decorative as well as practical. The latticework, which now supports bowers of ivy and morning glory in summer, may be lifted off the nails easily when repainting is required.

In another case, a client who lives in a brownstone asked me to design a tool shed for his backyard. At the far end of the plot was a large, vigorous wisteria that spilled over from a neighboring garden. To appropriate some of this beauty I designed a six- by six-foot shed with pergolas supported by columns extending from its roof on two sides. The shed now serves two functions — cradling the wisteria and housing my client's gardening tools. At this same site, the rear surface of the three-story

brownstone facing the garden was a terrible eyesore, with crumbling brick work and peeling paint. To hide these imperfections and add to the garden's appeal, I covered the entire building with square-pattern lattice, with an opening for each of the windows. After first painting the building dark green, I built the lattice in modular panels and painted it a lighter green. Each of the panels was secured in place by screwing it to metal L brackets that are screwed into the brick. The lattice remains separated by

inches from the building's surface, and may be readily removed for repainting.

It's hardly necessary to embark on such an elaborate undertaking to enjoy the rewards of latticework. A small panel inserted into a container to support a vine, or a single panel attached to a wall to accommodate a climbing rose can be just as effective. Once the basic materials are understood, simple lattice construction can be tackled with aplomb by even the most inexperienced woodworker. The basic component, flat wooden lattice (or lath) is available at most lumberyards in widths ranging from three-quarter inch to one and five-eighths inches. Your choice of size will depend on whether you're after delicacy or strength in both look and function. For even greater rigidity, such as might be required for stouter vines like wisteria, you might choose wood sized one by two or one-half by two to overlap lattice fashion.

Deciding which criss-cross pattern to use — diagonal diamonds or straight up-and-down squares — is purely a matter of personal preference. How widely you space the laths will be determined largely by function. Laths spaced far apart, for example, lend a light, airy look, but won't provide much privacy or protection from the wind. Obviously, the latter two considerations demand tightly positioned laths.

To make a simple square or rectangular



A latticework wall is a distinguished backdrop for a formal urban garden.

trellis panel, construct a four-sided frame using one by two (actually three-quarters by one and a half) or one by three (three-quarters by two and a half) lumber. Lay the cut laths across the frame in your preferred pattern and secure them to the frame and each other at the cross points with a heavy-duty staple gun. To cover the lath ends, back the frame, along its perimeter, with more one by twos or one by threes. A series of these completed panels can be nailed to sturdy posts to form a fence or put together as modules

to form any number of imaginative configurations.

For the fainthearted, preassembled diamond-pattern lattice panels are sold at lumberyards in four-by-eight- and two-by-eight-foot sizes. The lath width on these is one and five-eighths inches, and the panels are sold untrimmed; that is, they must be framed with one by twos, one by threes or specially grooved lumber made for this purpose. Once trimmed out in this fashion and painted, these panels become versatile modular units that can be nailed together in various arrangements to form fences, screens and struc-

tures. Be forewarned that these products are pressure treated for weather resistance, meaning that the wood used has been injected with arsenic. Be sure to wear gloves and a breathing mask when sanding or sawing.

At one time, I recommended using only treated lumber, but potential harm to the worker and the environment has prompted me to reverse myself. Instead, purchase top-grade, *untreated* pine and before painting, apply a coat of one of the new low-toxicity, water-repellent preservatives available at hardware stores. This precaution, along with painting all lumber with two coats of outdoor house paint before assembly and repainting at the first sign of deterioration, will guarantee that the work will endure for generations.

My own color preferences for traditional lattice construction are white, dark green, light blue-green and gray. Be sure to use only galvanized or concrete-coated nails, staples and metal brackets to avoid marring the finish with eventual rust



A square-pattern lattice painted dark green hides the imperfections of a building.

streaking. And always provide a footing of brick, concrete or stone for any free-standing structure. Resting on bare earth or lawn exposes the wood to too much moisture, leading to rapid deterioration.

To avoid painting entirely choose one of the hardwoods that naturally develop a handsome silvery patina with time, particularly plantation-grown teak (the harvest of which does not damage rainforests), cedar, black locust, catalpa or white oak. Also popular is the rustic look of structures fashioned entirely of raw twigs and boughs. These can be used to great effect if your city parcel favors this style, one in which your efforts will be centered on choosing and gathering rather than constructing and maintaining. A variety of materials, from bamboo to metal tubing to stonework, are available for enhancing small spaces — all you need is a little imagination.

No matter how simple or ornate your venture into garden architecture, you'll be



This lattice was created in panels so that it can be removed for painting or repairs.

happier with the result if you map it out beforehand. Use graph paper and draw the plan of your site to scale. Then indicate whatever arbor, bench or fencing seems appropriate for the space. Experiment with spatial relationships until you come up with something that suits your needs. Then draw plans of the structures you've decided upon, making them as detailed as possible, assessing the size and amount of material you'll need.

The details and finishing touches will determine whether your garden structure is a knockout or simply passable. Post finials and other ornamental trimmings are available from such mail-order concerns as: American Wood Column, Brooklyn, NY, (718) 782-3163; Irreplaceable Artifacts, New York, NY, (212) 777-2900; and Classic Architectural Specialties, Dallas, TX, (214) 748-1668. Books offering design inspiration include: *The Well-Furnished Garden* by Michael Balston (Simon and Schuster);

House of Boughs, edited by Wilkinson and Henderson (Viking Penguin); *Garden Furniture and Ornament* (Apollo Books, Poughkeepsie, NY); and *The Classic Garden* by Graham Rose (Summit Books).

For those who prefer their garden structures ready-made by others and for whom expense is no object, there are a number of manufacturers and distributors. The English Garden of Redding, CT, and Country Casual Furniture of Germantown, MD, for example, offer quality-grade, prefabricated trellis panels, posts and arbor arches. These are modules designed to be mixed and matched in whatever arrangement suits your fancy. In addition, a variety of small wooden and metal arbors, panels and archways may be mail-ordered from such catalogs as Wayside Gardens, Smith and Hawken and Gardener's Eden.

Among their myriad recommendations, arbors and trellises are a means of lifting




An arbor with *Laburnum*, the golden-chain tree, covers a walkway. Its dappled shade invites a stroll.



A lattice archway on a snow-covered terrace creates an illusion of space.

fragrant blossoms to the level of visitors' noses, so no survey of garden structures is complete without some mention of the vining plants that are their very *raison d'être*. The first that comes to mind is the rose. Roses and trellises are practically synonymous, and there's probably no more beautiful sight in the garden than bowers of ramblers or climbers in full bloom stretching over white lattice. Other show-stopping flowering vines that are ideal for trellis support, and like roses are hardy in the frostier parts of the country, are honeysuckle, wisteria, clematis, climbing hydrangea and *Passiflora* 'Incense'. Tender tropicals that may be brought indoors in winter are jas-

mine, *Mandevilla*, *Stephanotis*, *Hoya* and most passionflowers. For annuals, try morning glory, moon flower and canary creeper (*Tropaeolum peregrinum*). For non-flowering, rambling green growth, nothing surpasses English ivy. If you prefer a dash of color, try the cultivar 'Gold-heart', with yellow-variegated leaves. Another foliage vine with striking color (pink- and white-tipped leaves) is the male form of *Actinidia kolomikta*. And don't forget vegetables. Scarlet runner and hyacinth beans, vining cucumber and indeterminate, small-fruited tomatoes will all happily climb onto trellis structures as they work to supply you with nutritious edibles. 

THE ART OF BIRD GARDENING

BY PATTI HAGAN

Senior American birdman Roger Tory Peterson characterizes as “bird gardeners” people who sow their gardens “not only with flowers but also with cardinals, orioles, jays, bluebirds, purple finches and goldfinches.” I bird-garden almost as much as I flower-garden, getting permissive and allowing a lot of questionable plants — pokeweed, smartweed, nightshade, thistles — to continue in my city garden by way of bird fodder. Bird gardeners also have the habit of putting up bird houses for any birds who’d care to share the address. Usually these are miniatures made in the image of the suburban box — detached dwellings, no row birdhouses, no bird duplexes — except, of

course, for purple martin condos.

A couple of years ago I found an A-frame birdhouse out on the street with a neighbor’s trash. Not wanting to be responsible for more homeless birds in this city, I retrieved it and relocated it in the old crabapple out back. Possibly because it was rather small — an S.R.O.* — no birds ever moved in. However, nearby in the Dorothy Perkins rambler rose thicket that same spring, I caught a pair of cardinals nest-making with 50 percent man-made plastic fast-food detritus off Flatbush Avenue. Right then I vowed to do my best to get the birds of Brooklyn back to basics: whole-

* S.R.O.: Single room occupancy



English sparrow.

CHRISTINE M. DOUGLAS



Starlings.

CHRISTINE M. DOUGLAS



Mourning doves.



Black-crowned night heron, a denizen
of ponds and streams.

some, organic, all-natural nesting materials.

To this end I let dandelions have their powderpuff heads and certain rogue grasses thrive along the bluestone path. I did not dispose of old fern fronds and broken twigs if I thought they could be bird-useful. Even so, this spring, while flipping through a gardening catalog, I was delighted to find an all-natural product called Samson Nesting Material. Six dollars would buy "enough . . . to build 12 nests."

The "sterilized" nesting material arrived, late April, in a cardinal-red box: "feathers, moss, hair, string, cotton" packaged by a company called Wildlife Products (P.O. Box 363, Wisconsin Rapids, WI 54494). There was a lot of copy to read on the box, with key phrases ("Blended to Attract Colorful Songbirds of North America" and "Watch the Birds Build a Nest!") repeated on two sides. The stuff was, the box said, "designed to be perfect for blue-



A house finch perches on a branch of *Cedrus atlantica* 'Glauc'.
 CHRISTINE M. DOUGLAS

birds, robins, wrens, chickadees, finches, martins, cardinals and hummingbirds." Since the only species observed nesting in these parts during my tenure have been robins, mockingbirds, cardinals and mourning doves, I was eager to believe that "more than 50 species of North American birds will use this nesting material." After studying "Some Ways to Present Nesting Material," I chose the "Directly on Ground" method, described as "the most natural way for birds." Within an hour of informal presentation, several songbirds *not* mentioned in the prospectus of coming bird attractions hit on the nesting goods. Starlings! Choosy starlings. Very quickly they made off with all the white bird feathers. Nothing else. The robins, cardinals, mockingbirds, catbirds were not interested, to say nothing of any of the 45 other songsters I could wish. (My cat, Be-bop, picked out the string to play with.) Two months have passed, the first broods of robins and cardinals have fledged, and the mound of authentic, old-fashioned nesting material remains directly on the ground between a rock and a hard place, getting more unsterile by the day. Contemplating my backyard wildness, I was puzzled as to why so many songbirds would pass up such good mail-order fixings until I went back to the red box for further reading: "In a yard that is kept 'spick and span' the birds will not be able to find the natural materials they need to build their nests." (Clearly I have the wrong gardening style for the product.)

This insight set me to rummaging in the "Bird Homes" chapter of Margaret McKenny's 1939 book *Birds in the Garden*. There I read: "In the scrupulously tidied garden birds often have difficulty in finding materials with which to build their nests . . . In the modern, well-cared-for garden, every decayed branch has been removed, every cavity has been filled and all dead trees are

immediately cut down."

Not so in this modern garden, which tends toward *laissez-faire*. No way can it be cited for spick and span. The two main trunks of the crab have fallen in the past three years and remain on the horizontal, where clematis and wisteria can engulf them. They are well-rotted and favored feeding stations for yellow-shafted flickers and downy woodpeckers. They also grow lovely rippled fungus borders. Birds have dropped wild multiflora rose seed near the house and now the multifloras have climbed the deck, raddling with the Asiatic bittersweet and making an impenetrable nesting thicket plus producing little red rose hips. (And all along I had the habit of sharing the plush white hair of my late Samoyed, Tofu, with the birds during the dog's awesome spring sheddings.)

And then there's the moss. A while ago, inspired by the Moss Temple in Kyoto, I dedicated a small patch of my garden to moss. I sank a roasting pan and laid on rehydrated sphagnum sheet moss for a moss pond, which soon grew to have thickly moussed, brilliant green verges. Robins make bold to strip mine my moss — it has been the stuffing of countless robins' nests these past five years — such that by early June the moss pond is revealed for the dark blue, white-speckled turkey roasting pan that it is. Never mind.

However, I'm assuming that low maintenance, spick-and-span gardeners are in the majority nowadays. And it is for them that Samson Nesting Material was conceived. The spick-and-spanners can keep their tidy garden ways and still put out the messy stuff of bird domesticity. After all, as Margaret McKenny observed: "A garden without birds would be a semi-desert from the esthetic standpoint."

This article first appeared in The Wall Street Journal June 29, 1988. It is reprinted with permission of the author.

CHRISTINE M. DOUGLAS



The house finch is a common backyard bird.

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White marguerites flourish on a sun-baked urban terrace.

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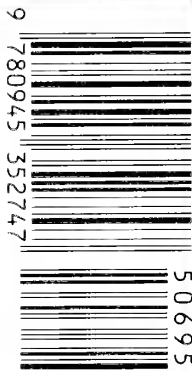
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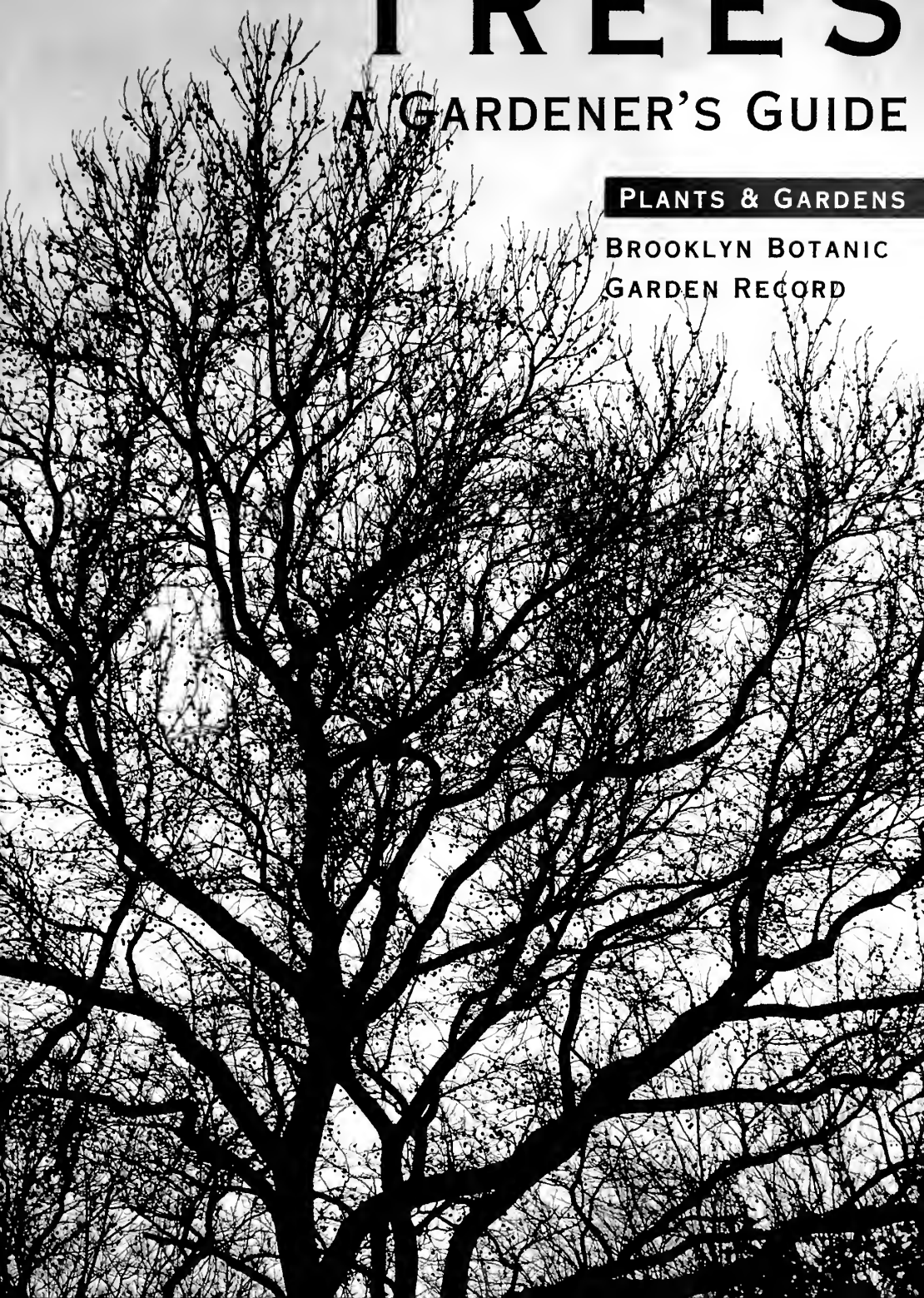


TREES

A GARDENER'S GUIDE

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PHOTOGRAPHY BY CHRISTINE M. DOUGLAS

PLANTS & GARDENS
BROOKLYN BOTANIC GARDEN RECORD

TREES

A GARDENER'S GUIDE

VOL. 48, NO. 3, AUTUMN 1992

HANDBOOK #132

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FOREWORD

Trees are the backbone of the garden. True, they are important structural elements in the landscape, but as living organisms they are much more. They provide the cooling shade that tempts us to linger in the garden on a hot summer day. Street trees make our cities more habitable by giving visual relief to the asphalt landscape, and at the same time they help cut down on noise and purify the air. On a global scale, trees are vital for oxygen regeneration.

We ask a lot of every tree we plant, so it behooves us to choose wisely and plant carefully. To help gardeners, landscapers, nurserymen, urban foresters and planners analyze a planting site and select the best tree for its location, BBG offers this new handbook of 100 excellent trees for a wide range of landscape situations.

The trees described in this volume come highly recommended by expert horticulturists across the country. Many thanks to the following people for their help in compiling the list:

Robert Breunig, Desert Botanical Garden; Michael A. Dirr, University of Georgia; Harrison L. Flint, Purdue University; Edward R. Hasselkus, University of Wisconsin; Allen R. Howard, Los Angeles State and County Arboretum; Arthur H. Ode, Nebraska Statewide Arboretum; Harold Pellet, Minnesota Landscape Arboretum; Ken Slump, Denver Botanic Garden; and Shannon Smith, Missouri Botanical Garden.

We hope this handbook will inspire you to seek out your own finest 100 trees — and to plant at least a few of them.

JUDITH D. ZUK
GUEST EDITOR

Consider bark texture when selecting a tree.
At left is *Stewartia pseudocamellia*.



SELECTING THE RIGHT TREE

BY PAUL W. MEYER

When gardeners select and buy a tree, we rarely give the purchase the same careful consideration that we give an automobile or other major purchase. Though its initial cost may not be so great, a tree is an investment that can satisfy a family for generations.

Choosing a tree can be a challenging task, but it's easy to cut the project down to size by following the suggestions below. The best way to begin is with a few simple observations. Stand at the site that you have chosen for your tree. Look around. In midsummer, would it be in the open or in the shade? Would there be full sun all day? Are there structures or other large plants nearby?

Next, look at the trees growing in your community. What are they? How big are they? How long have they been there? Are they holding up well to environmental

stress? And, are they attractive and appropriate for the site that you have in mind? Observe as many trees as possible throughout the community, visit local botanic gardens and arboreta and, finally, get advice from reputable nurseries. This will help insure that your arboreal investment yields long-lasting dividends.

The Science of Choosing Your Tree

To be vigorous and long-lived, a tree species must be well adapted to its site. Climate and soil are the most important considerations. Tree species vary in their adaptability to environmental conditions. Before planting, know the temperature extremes in your area. A hardiness zone map (see page 93) can serve as a guide. Well-adapted species will tolerate both extremes of winter cold and summer heat. Similarly, a well-adapted tree will be suitable to the soil and light conditions of the site. It is important to know the relative alkalinity or acidity, or pH, of the soil. This can be measured using a sim-

PAUL W. MEYER is *Director of the Morris Arboretum of the University of Pennsylvania.*

Left:

Young *Betula nigra* 'Heritage' in spring.

ple kit available in garden centers or through your local county cooperative extension agent. Some trees such as pin oak (*Quercus palustris*) require acidic soil, or a low pH. If the soil is neutral (a pH of 7) or alkaline (a pH above 7), the leaves of the pin oak will become yellow and chlorotic. Even when soils are generally acidic, alkalinity may be a problem near foundations and pavement, where calcium leaches from the mortar and raises the pH. Trees such as bur oak (*Quercus macrocarpa*) are well adapted to alkaline soil and should be used in these instances.

The relative availability of water in the soil is also critical to the tree's health. Both too much and too little water can be a problem. Observe the existing soil conditions. If the soil is sandy and dries quickly after a rain, use drought-tolerant species such as turkish hazel (*Corylus colurna*) or black oak (*Quercus velutina*). If the soil is heavy and puddles of water persist after a rain, a tree species native to flood plains or swamp

ELVIN McDONALD



ROBERT H. HAYS





Left: The native dogwood, *Cornus florida*, produces a white cloud of blossoms in spring. Above: The filigreed leaf form of Japanese maple, *Acer palmatum*.

edges such as river birch (*Betula nigra*), swamp white oak (*Quercus bicolor*) or red maple (*Acer rubrum*) is most appropriate. Also remember that all trees require at least some direct sunlight but some, such as dogwood (*Cornus florida*) tolerate more shade than others.

Our increasing awareness of the danger of toxic sprays is making more evident than ever the importance of using trees that are naturally resistant to both insects and diseases. For example, some crabapple cultivars such as 'Hopa' are highly susceptible to disease while others such as 'Donald Wyman' are highly resistant. Some of the

best disease-resistant plants are listed in the encyclopedia section of this handbook.

Disease and insect resistance can also be influenced by the site. Often, if a plant is poorly adapted to its particular growing conditions, it may well be biologically stressed and become more susceptible to insects and diseases. A plant in an appropriate site is more likely to be resistant to insect and disease attack. This is all the more reason to do some research before buying a tree.

Size and Habit

Imagine your tree ten or 20 years from



Fruits provide seasonal color and also attract wildlife to your garden. The bright orange-red fruits of 'Winter King' hawthorn persist long into winter.

now. Will it crowd its neighbors? Will it shade your sun-loving vegetable garden? When selecting a tree it is important to know its ultimate size and shape. Far too often, trees quickly outgrow the available space and must be removed or severely pruned at great expense. But there are trees for all situations. For a small, confined area, small, open-growing trees with fibrous root systems such as the sweet bay magnolia (*Magnolia virginiana*) are a good

choice. Likewise, avoid planting large canopy trees under utility wires. Instead, select small understory trees such as European hornbeam (*Carpinus betulus*).

Next, consider the growth rate of desirable trees. Fast-growing species are often tempting, particularly if there are no other trees on the property. Generally speaking, fast-growing trees are weak-wooded, subject to breakage and often short-lived. Rather than selecting a fast-growing, weedy tree

such as silver maple (*Acer saccharinum*), it is usually better to select a slower-growing tree that is well-adapted to the site. With regular watering and fertilization, even a reputed slow-grower such as red oak (*Quercus rubra*) can grow three feet per year. Your patience will be rewarded ten to 15 years from now when a slower-growing tree continues to be a valued asset in the garden rather than an unwanted nuisance.

The overall form of the tree is also a major consideration. Upright, ascending trees such as Japanese zelkova (*Zelkova serrata*) are useful along roads, paths or close to buildings. Broad spreading trees are most useful on an open lawn where extensive shade is desired. Many cultivated varieties of the commonly planted species have been selected for their varying forms. Red maple is a striking example. Its cultivar 'Armstrong' has a narrow columnar form; 'Autumn Flame' is rounded; 'Bowhall' has an upright oval to pyramidal form; and 'Gerling' is broadly pyramidal. Choose the cultivar that best suits your needs.

The Art of Choosing Your Tree

Now that you have considered the cultural requirements of your tree, you can turn with pleasure to the aesthetic considerations. Think about what you might enjoy most: distinctive foliage? Flowers? Fruit in winter?

If light dappled shade is what you want, a fine-textured tree such as thornless honeylocust (*Gleditsia triacanthos* var. *inermis*) is appropriate. Its finely cut, fernlike leaves allow dappled sunlight to penetrate the canopy to the ground. Similarly, if you're looking for a coarser texture or heavier shade, the common sugar maple (*Acer saccharum*) is a good choice. Fine-textured trees have smaller leaves which create less of a volume when they fall

in the autumn, a vital consideration in some urban areas.

If you want a more dynamic landscape, be sure to include flowering trees, which dramatically brighten the landscape. When choosing flowering trees, consider how the flower color blends with other colors in the landscape. Note the time of flower and the color of adjacent trees and shrubs as well as the dominant colors in nearby buildings. Take care to avoid clashing colors and plan for pleasing combinations and an interesting sequence of flowers in your garden. Too often, only early-spring flowering trees like crabapples and flowering cherries are planted. Late-flowering trees like golden-rain tree (*Koelreuteria paniculata*) and Chinese scholar tree (*Sophora japonica*) are welcome additions because they bloom in summer when few other trees are in flower.

Tree foliage also adds color to the landscape. Trees such as the purple-leaved European beech and purple-leaved plum are popular. When used indiscriminately, they can be jarring. But when used judiciously, they can be a welcome accent. The secret is to use colored foliage sparingly, as a focal point.

Fruits, too, can provide seasonal color and also attract birds and other wildlife to your garden. The winter king hawthorn (*Crataegus viridis* 'Winter King') is one favorite with bright orange-red fruits which persist long into the winter. Its fruits can be attractive for a period of up to three or four months while its flowers typically last no longer than a week. It is a wonderful sight to see the fruits of this hawthorn being stripped off in late winter or early spring by robins and cedar waxwings migrating north.

Choosing a tree is a challenge, but a potentially rewarding one. "A penny for the plant, a pound for the planting" goes the adage. Likewise, when you plant a tree, invest a penny for the plant and a pound for the *planning*. 🌳



TRANSPLANTING & CARE

BY EDMOND O. MOULIN

Transplanting is one of the most critical times in the life of a tree. Preparing the planting hole is of paramount importance. As the old saying goes: "Never put a two-dollar plant in a fifty-cent hole."

Before I get into the art of digging a hole and preparing the soil, however, I should mention that the first order of business is getting the tree home safely. If you are transporting the young tree, make sure you protect it from drying wind, even if the plant is dormant.

The Planting Hole

Dig the hole at least two to three times wider than the root ball. The larger the root system or the higher it is planted, the greater the width of the hole. The depth of the hole must accommodate the roots. If it is necessary to dig deeper to remove rubble or break up hardpan, firm the fill to

support the root system and prevent sinkage. Avoid compacting the soil, especially wet soil.

In good, well-drained soil, plant so that the top of the root ball is nearly level with the surrounding grade. If the soil is heavy and drainage is poor, plant so that the top of the root system is three to four inches above the surrounding grade, and dig the hole at least three feet wider than the root system.

Preparing the Soil

If the soil structure is good, you won't have to add organic matter. However, poor soil can be improved by adding compost, sphagnum peat moss or any good garden humus. Organic matter helps aerate heavy clay soils and improves water retention in sandy soils. Add ten to 30 percent organic matter.

The backfill should be good enough to encourage root growth laterally into it from the existing root system, but not so different from the undisturbed surrounding soil that it becomes an artificial container that

EDMOND O. MOULIN is *Director of Horticulture at the Brooklyn Botanic Garden.*

Left: Balled & burlaped trees are less likely to develop girdling roots than container-grown trees.

restricts future root growth. It is in the backfill that amendments recommended in your soil test, such as agricultural limestone or phosphorus, should be mixed.

Positioning

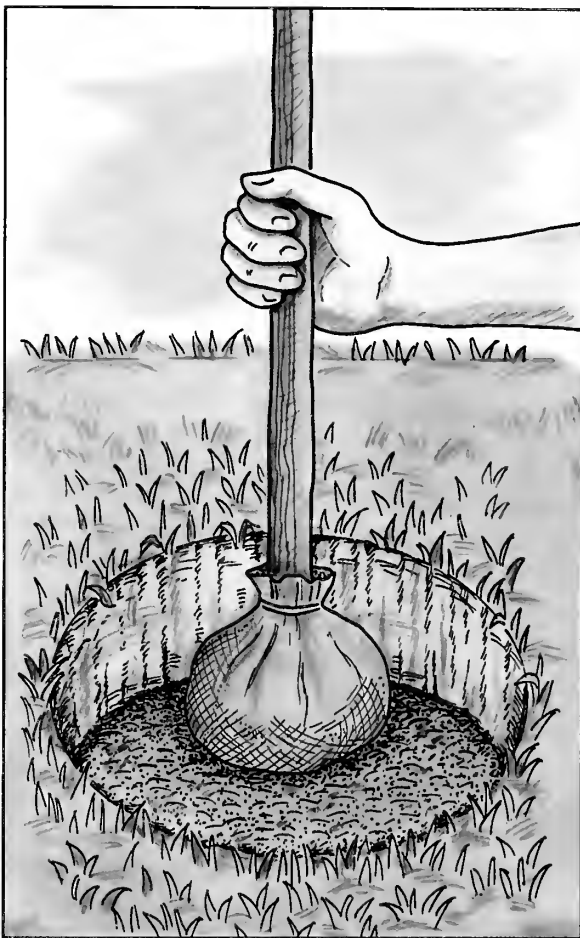
Plant so that the trunk is vertical unless you prefer a slanting style for a Japanese or naturalistic landscape. If the tree seems to be one-sided, place the more sparsely branched side to the south. If the trunk is fairly straight but the top of the tree seems to bend to one side, plant with the list into the prevailing wind or else to the north. Future growth will help to balance the tree's architecture.

Bare Root Trees

Trees up to ten feet tall and less than two inches in diameter may be sold bare root. Young trees that are not too difficult to transplant, and especially fruit trees or their ornamental relatives, are sold bare root in early spring while they are still dormant. Mail order stock is handled in this manner.

Plan to plant as early in the spring as the soil can be worked. When you receive the tree, unwrap and inspect it and determine the depth and spread of the root system. Do not allow the roots to become dry. Prune to remove broken, damaged, crossover and other roots that do not radiate out (away) from the trunk. Soak overnight in water or a slurry of mud to hydrate the tissues.

In the meantime prepare the hole and mix the backfill. Spread the roots out and



Dig the planting hole at least two to three times wider than the root system and just deep enough to accommodate it.

start filling the hole to hold the radiating roots in place, firm lightly, and start adding water slowly, gently wiggling the tree to remove air pockets. Add soil to the settling soil using a thin dowel-rod, such as a chopstick, to work the soil into the mud around the roots and work the air bubbles out. The surface roots should be left at grade with the surrounding topography or up to three to four inches higher in poorly drained sites. In this case the roots should be covered with soil as on a mound tapered to the surrounding grade.



The "backfill" can be improved with compost or peat moss but should not differ greatly from the surrounding soil.

Create a saucer for watering (see "Mounding the Soil" below), mulch and stake if necessary.

Container-Grown Trees

Container-grown trees can be planted at any time of the year. After removing the tree from the container, examine the root system. If the roots are fine, use a hand fork-tine cultivator to loosen the outer layer of roots which tend to mat at the sides. If the roots are heavy and encircling, make four vertical cuts at the periphery of the

root mass using a sharp knife or a sharp spade. Use hand pruners to remove encircling roots that cannot be redirected.

Using the same tools, open outward the roots that grew at the base of the container. This can be safely done to halfway up the root ball. Finally, check the roots at the top of the ball to be sure there are no large roots that might girdle the trunk.

Now set the tree in the hole on a mound of soil, spreading the roots outward. Fill the hole about half full with the prepared backfill, then firm lightly. Water slowly, working in more soil using a dowel-stick to eliminate air pockets (or use the hose itself). Do not compact the soil.

Balled & Burlaped Trees

Deciduous trees that are dug while dormant can be safely planted at any time, even when in full leaf, if they are properly maintained before and after planting. B&B plants are less

likely to develop girdling roots than container-grown plants. The disadvantage of B&B stock is finding the top of the root system; the top of the ball may not be it. Cultivation practices in the nursery row may result in soil buildup over the roots, and to compound the problem the tree may have been planted deeply to begin with, leaving the top of the ball three to six inches higher than the surface roots. Unless you can feel the roots, it is impossible to determine their depth without opening the burlap. Do this with care, being sure not to

cut the cord lacings. Cut out windows of burlap on the top of the ball to check. If there is excess top soil, plant accordingly (see "Planting Hole" above) and remove the excess after planting is completed.

Backfill with the prepared mix to three fourths of the way up the depth of the root ball. While watering slowly, remove the lacings from the base of the trunk and fold back the burlap into the hole. Finish planting as for container-grown stock.

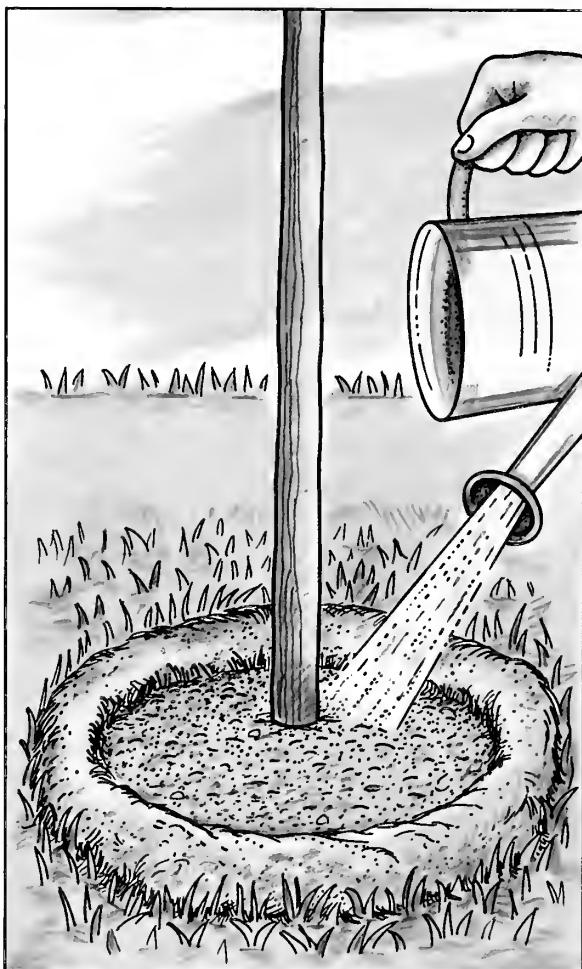
Mounding the Soil

Create a "basin" for holding water by building a mound of soil three to four inches high at the outer rim of the planting site and firm it. This will help to catch rain and make watering easier.

Pruning

A bare root tree needs to be more severely top pruned than B&B or container-grown plants to compensate for root loss so that the remaining root system can adequately supply water and nutrients to the top growth. Remove any broken portions of branches. Thin out closely spaced branches and cut back lateral branches by a third. Do not cut back the central trunk or lead unless it is damaged or weakened or unless you want a low-crown tree.

Prune B&B and container-grown trees to remove broken branches below the point of injury. Remove crossing branches and, if necessary, prune back some of the laterals to balance the shape. Where possible, remove branches that form narrow-

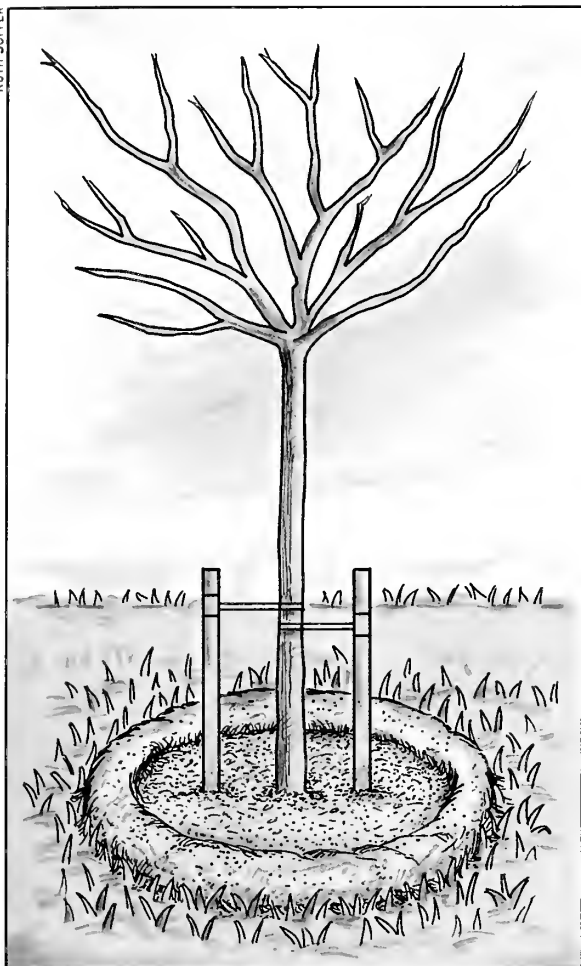


Create a "basin" to help catch rain and make watering easier.

angle crotches with the main trunk. These V-shaped structures are inherently weak and subject to breakage in the future. Most nursery-produced trees are well pruned and do not require extensive pruning.

Staking

Newly planted trees can be uprooted by heavy winds or human actions. Stake the trunk until new roots provide the necessary anchorage. The support system should be in place only for a growing season for smaller trees and possibly up to two



Stake small trees for one growing season and larger trees for up to two years.

years for larger trees.

Air movements flex the tree trunk, building caliper (width) and strength. For this reason, it is sometimes recommended that trees be staked low down on the trunk. Short stakes, however, can be hazardous, because people are more apt to trip over them. What's more, higher stakes help protect the tree from damage by cars, bikes and the like.

One stake driven down close to the trunk may be enough for bare root trees. Tie a strip of burlap or soft organic cord,

such as hemp, around the trunk in a figure eight and secure it to the stake.

For larger trees, drive three stakes vertically outside the area of the root system. Use pliant wire put through a short piece of rubber hose (to protect the trunk), then cross it in a figure eight and twist the wire around the stake tight enough so that the wire won't slip.

Watering

When it has been seven to ten days since a good soaking rain, fill the basin with water. Allow to soak in and fill it again. Water deeply when necessary for at least the first growing season.

Mulching

Apply a three- to four-inch layer of non-compacting organic mulch within the saucer area. Shredded hardwood, oak leaves, pine needles or pine bark are all suitable. Mulch reduces water loss from the soil, keeps the soil temperature stable and

discourages weeds.

Fertilizing

When new growth appears, apply a liquid fertilizer diluted according to the manufacturer's directions. Repeat once a month until mid-July. Never fertilize dry soil (even if the fertilizer is diluted in water).

The following spring when you fertilize the lawn, be sure to share the broadcast with the tree. But be sure not to use combined herbicide/fertilizer formulations!







ELVIN McDONALD

URBAN TREES

BY NINA BASSUK

With all of urban America's social problems, why should we even consider the plight of trees? Quite simply, green space makes the urban environment bearable. Trees and other vegetation help purify and oxygenate the air and also play a role in replenishing groundwater supplies and reducing storm-water runoff. By providing shade and blocking wind, urban trees also help conserve energy. Mass plantings reduce noise and glare. Urban vegetation provides critical habitat for birds. Properly placed trees and shrubs also screen unsightly views and beautify the city. By helping to create a unique identity for a neighborhood, trees even help preserve its economic base.

And yet we take street trees for granted. Recent surveys indicate that in cities four trees are dying for every one planted, that the average life-span of a "downtown" city tree is *seven years* and that cities are only 40 to 50 percent planted. Unless these trends are reversed our cities will eventually become treeless.

NINA BASSUK is *Director of the Urban Horticulture Institute at Cornell University.*

Left: Restricted root growth is a major problem for city trees.



Street microclimates can be substantially hotter and less humid than other environments, causing severe water deficits.

Why is street tree mortality so high?

All plants have six basic needs: water, nutrients, light, a certain range of temperature, oxygen and carbon dioxide. If any one of these falls below a certain threshold for a particular plant, the plant will begin to decline and eventually die. When trees are growing below an acceptable level they are experiencing stress — either “abiotic,” caused by deficiencies in the physical environment, or “biotic,” caused by insects and disease. Trees in the urban environment have to deal with a disproportionately high number of abiotic stresses because they were added as an afterthought to the built environment. By definition, road and sidewalk construction requires that soils be highly compacted to prevent subsidence. When trees are added to this environment their roots are often restricted by the compacted soil on all sides, almost as if they were in a container. This containerization,

which can also be caused by underground utilities and buildings, restricts root growth and therefore limits the trees’ catchment area for water and nutrients. Compaction also restricts water drainage, which can displace oxygen in the root zone for so long that roots die. Poor drainage probably destroys urban trees faster than any other factor. The prevalence of above-ground planters in areas where in-ground planting is impossible compounds the problem of containerization by exposing roots to potentially very low temperatures in winter and very high temperatures in summer.

The problem of restricted root growth is compounded by high-pH soils and de-icing salts. It is now recognized that run-off from concrete and asphalt into tree-planting areas, combined with limestone-containing building rubble incorporated with the street “soil,” raises soil pH. Alkaline soils prevent essential micronutrients such as iron, man-

T • R • E • E • S

THAT TOLERATE ENVIRONMENTAL STRESS

D=DRY; A=ALKALINE; W=WET/POORLY DRAINED; S=SALT

<i>Acer campestre</i> (Hedge maple)—S	<i>Ginkgo biloba</i> (Ginkgo)—D
<i>Acer platanoides</i> (Norway maple)—S	<i>Koelreuteria paniculata</i> (Goldenrain tree)—D
<i>Acer pseudoplatanus</i> (Plane tree)—S	<i>Nyssa sylvatica</i> (Tupelo)—W
<i>Alnus glutinosa</i> (European alder)—W	<i>Platanus x acerifolia</i> (London plane)—W
<i>Betula nigra</i> (River birch)—W	<i>Quercus bicolor</i> (Swamp white oak)—W
<i>Caragana arborescens</i> (Siberian peashrub)—S	<i>Quercus muhlenbergii</i> (Chinkapin oak)—D
<i>Celtis occidentalis</i> (Common hackberry)—D	<i>Quercus rubra</i> (Red oak)—S
<i>Corylus colurna</i> (Turkish hazel)—D	<i>Robinia pseudoacacia</i> (Black locust)—S
<i>Crataegus</i> species (Hawthorn)—D	<i>Sophora japonica</i> (Japanese pagodatree)—D, S
<i>Eucommia ulmoides</i> (Hardy rubber tree)—D	<i>Syringa reticulata</i> (Japanese tree lilac)—D
<i>Fraxinus pennsylvanica</i> (Green ash)—W	<i>Taxodium distichum</i> (Bald cypress)—W
<i>Ulmus parvifolia</i> (Lacebark elm)—D	

ganese and zinc from being taken up by many of our typical street trees, such as *Acer rubrum* (red maple), *Quercus palustris* (pin oak) and *Acer saccharum* (sugar maple). When these nutrients, which are necessary for the synthesis of chlorophyll, are deficient, leaves become chlorotic and turn yellow. Lack of chlorophyll in turn decreases the trees' ability to utilize carbon dioxide, light and water in the process of photosynthesis which is fundamental to plant growth.

Salt can be another factor which limits a tree's ability to take up water or kills leaves outright when levels of sodium and chloride become toxic. During bad winters it has been reported that 80 tons of de-icing salts are applied to each lane mile of Chicago's freeways.

Above ground the environment can also be harsh. Trees have evolved to grow in groups and thereby shade each other; however, the typical way that street trees are

planted, singly in rows 30 to 40 feet apart, leaves them exposed to reflected and reradiated heat from building facades, car tops, concrete and asphalt. A study we completed on Columbus Avenue in New York City in 1985 documented that the street microclimate could be substantially hotter — up to 22 degrees F hotter in one instance — than the official temperature reading at a nearby park; on that August day, the official air temperature was 86 degrees F, yet it was 108 degrees F on the street! Aggravating the already bad situation were the 30 percent lower humidities that were also detected, giving rise to an environment which causes the leaves to lose water rapidly. A high rate of water loss from the leaves combined with a restricted root system and vast acreages of impervious pavement limiting the root zone's access to precipitation can cause severe water deficits.

So far in this discussion of abiotic

stresses, I have not mentioned air pollution. And interestingly enough, contrary to popular belief we rarely see symptoms of air pollution injury except in cities such as Los Angeles which are noted for their smog. In most cities throughout the United States, air pollution does not appear to be a major source of injury to plants.

Understanding both a tree's requirements and the environmental conditions commonly found within a city makes proper plant choices much more likely.

Although the environmental stresses mentioned above can be found in all cities, each planting area is unique and must be assessed individually. The urban environment is in fact not one environment but a variety of microclimates both above and below ground. You need only look at the non-uniform growth of identical cultivars planted in a row to see evidence of vastly different conditions within a short distance. It is the proper analysis of the limitations and opportunities at each planting area which will enable you to make proper plant selections.

Assessing the Site

The first thing to do is to make sure you are within your legal rights. Many cities have ordinances restricting where and what you may plant. If you are planting on a state road or near a railway, still other easements and restrictions may apply.

Structural Factors

Check out the planting site for structures, such as buildings, subways, roads, sidewalks, utilities, street lights, signs, heat-producing vents and street furniture. Note those that could physically and physiologically restrict your tree's canopy and root growth.

Soil Factors

The most critical of all soil tests is the one that determines the soil's drainage capabilities. Look for gray- or rust-colored mottling

of the soil, which may indicate poor drainage. Pockets of standing water after a rain are another sign of problems.

You can do a simple drainage test by digging to where the roots will be, filling the hole with water and timing how quickly it drains. Anything less than one inch per hour warrants some remedial action.

You should also test soil fertility and especially pH, which determines whether or not nutrients will be available to the plant. If de-icing salts are a potential problem, have the lab test salinity levels as well. Take samples for this test during late fall, winter or early spring. Samples taken during late spring and summer rarely show salt buildup because spring rains leach salts out of the soil. The best way to confirm a salt problem is in summer, when you can take foliar samples to test for sodium and chloride buildup directly in the leaves.

By doing a little digging, determine the depth and volume of usable soil. You will want to locate underground utilities and other barriers to root growth. Because soils in urban areas rarely have a normal soil profile, you need to know where the solid or compacted layers and rubble are. These not only block root growth, but also slow or prevent drainage.

Existing Vegetation

The identity and condition of existing vegetation on the site can provide clues about site conditions. So called "indicator species" can tell you what may or may not do well there. Some examples are sugar maples, red oaks and hickories, indicating well-drained soil. Sycamores and tuliptrees naturally grow in moist soils while tupelo, willows and swamp white oak grow in poorly drained, wet soils. Be aware, however, that construction alters soils so that they will be much different from those at nearby undisturbed areas.

Pay attention to the condition of existing vegetation. Are leaves showing premature



Group trees in open islands whenever possible, where root growth is less restricted and the trees shade each other, moderating the deleterious effects of reflected light and radiated heat.

fall coloration? Are they chlorotic or are leaf margins dying back? These symptoms can indicate drought, high pH or salt damage.

Microclimate

Check out the sun and shade patterns on your site. Most trees need full sun, although some will tolerate partial shade.

Determine which USDA hardiness zone the site is in (see page 93). Analyze specific site conditions to see how they might modify the macroclimate. For example, a protected courtyard may be half a zone warmer because surrounding buildings offer wind protection and radiate heat. On the other hand, heavy prevailing winds or above-ground planters may expose trees to lower-than-normal temperatures.

Functional Considerations

Note pedestrian traffic patterns on your site. Will people actually walk over your planting area? Is there a likelihood that

vehicular traffic will damage the plantings?

This is the time to make a mental note of the following as well: Are there any plants growing on the site? Are they plants you want to keep? Is the site currently unplantable? How much will you have to do to improve it? Could redesigning the site improve it? If you decide to plant, which are the most suitable species? You may decide to plant nothing or even to remove existing vegetation.

Plant Selection

The next step is to choose plants that will work on the site. Unfortunately, some city foresters have been overly concerned with finding the "perfect urban tree" — one that can withstand the entire range of urban environmental assaults. The original candidate was the American elm, *Ulmus americana*, which was so widely planted that its demise due to Dutch elm disease devastated many urban areas. As recently as 1971, it was estimated that 45 percent of all street

trees in Chicago were elms. Planting all one kind of tree (known as a monoculture) does not make sense in the long run, as we are finding out with the 1960's "elm replacement" tree the honeylocust, *Gleditsia triacanthos*. It too is a tough tree, tolerant of drought, high soil pH and salt, and is easy to transplant. Now, however, we are seeing a buildup of insect pests on this tree (honeylocust plant bug and spider mites to name just two) which can be linked to the concentrated food supply. A diversity of trees matched to their proper site conditions is best.

Key factors to consider when determining a tree's suitability for a particular site are its adaptability to temperature, light and soil conditions. For example, pin oaks are almost guaranteed to develop chlorosis in alkaline soils. You will be setting yourself up for failure if that's what you select for such a site. Characteristics such as form and tendency to litter sidewalks with fruit or spent flowers are other considerations.

Another important factor to consider is seed source. A red maple grown from seed collected in Georgia may not do well in the Northeast. You will have to ask your supplier for this information or purchase plants directly from a nursery with a climate similar to yours.

See page 21 for a short list of trees that tolerate urban conditions.

Planting Technique

By putting more care and effort up front — in planning and planting — you can increase an urban tree's chances of survival. It is much easier to choose a suitable tree and plant it properly than to have to figure out how to rescue a poorly growing specimen later on. (See the article "Transplanting & Care.")


Size of Planting Area

In many urban areas, soil space for good root growth is one of the most limiting factors. Our research at Cornell is aimed at learning

how much soil space a moderately large tree needs. At this point, our best estimate is that in the Northeast, a 30-foot tree with a 20-foot crown spread needs approximately 300 cubic feet of soil. That equals approximately a ten-by-ten-by-three-foot deep hole. Typically, even this minimally adequate area is not available because of curbs, sidewalks and compacted soil. Without space, a tree's growth is slow and stunted, and it never achieves its true characteristics.

Lack of rooting space is one stress that is difficult to overcome simply by selecting the right tree. However, several planting methods help increase soil volume available to the roots.

- Plant trees in continuous tree pits. Rather than separating individual planting areas for each tree, continuous pits run in a band. They usually parallel the street between the sidewalk and curb, and contain good, non-compacted soil. Trees in these sites have a much larger shared rooting space than those confined to a four-by-four-foot area.
- Plant trees in large, raised planters. These are usually open to the ground on the bottom and have a raised concrete lip that diverts salt-water runoff.
- Group trees in open islands. Trees in the group shade each other. Together they moderate the deleterious effects of reflected light and radiated heat. Because soil around the trees is open, rain penetrates to the roots and there is no soil compaction from foot traffic.
- Mulch the entire planting area to reduce evaporation from the soil surface.

Although future research will undoubtedly improve our ability to select suitable trees and modify planting sites, it is possible — right now — to successfully grow an urban tree and put together the elements of a successful tree-planting program. Cities must be made to be compatible with trees or our loss will be far greater than we can imagine. 

ADAPTED FROM AN ARTICLE IN THE PUBLIC GARDEN.



Trees planted in continuous pits running in a band between the sidewalk and curb have a much larger shared rooting space than those confined to cramped, separate pits.

100 TREES

FOR THE
HOME GARDEN



BY ANDREW BUNTING

ANDREW BUNTING is Curator of Plants at Chanticleer, a 32-acre private garden in Wayne, Pennsylvania, which will soon open to the public. He previously worked at the Scott Arboretum in Swarthmore, Pennsylvania, and at Tintinhull House in England.

A c a c i a b a i l e y a n a **COOTAMUNDR WATTLE, BAILEY'S MIMOSA**

OUTSTANDING CHARACTERISTICS:

This 30-foot evergreen is prized for its outstanding foliage and winter flowers. The tree is covered with fragrant, bright yellow clusters of flowers from January to March. The beautiful blossoms contrast strikingly with the elegant, steel blue, feathery leaves.

HABIT AND USE:

A rapid grower, this species maintains a slender, graceful

ROBERT M. HAYES



habit. As it matures it develops a round-headed crown. In southern California it is often used as a street tree. Because of its fine texture and relatively small stature it lends itself well to patio plantings as a specimen, or in masses. Its only draw-

backs are its brittle wood and tendency to be short-lived.

CULTURE:

Adaptable to various soils. Grow in full sun. No serious pest or disease problems.

VARIETIES OR RELATED SPECIES:

'Purpurea' — the striking, deep purple young foliage contrasts with the older blue-green leaves.

NATIVE HABITAT:
New South Wales,
Australia

HARDINESS ZONE

9

A c e r b u e r g e r i a n u m **TRIDENT MAPLE**

OUTSTANDING CHARACTERISTICS:

Excellent small deciduous tree reaching 20 to 25 feet with an equal spread. The small, three-lobed, glossy green leaves turn brilliant yellow, orange and red later in the fall than many other maples. In the winter its orange-brown, exfoliating bark is particularly pleasing.

HABIT AND USE:

Averaging two feet of growth per year, the trident maple has a round habit at maturity.

PAUL W. MEYER



The small shade tree is an effective street tree because it tolerates drought, air pollution and soil compaction. For the small property it makes a picturesque patio or small shade tree. For shade trees with a diminutive stature it is unrivaled in pest

resistance, adaptability and fall color. Often used as a subject for bonsai.

CULTURE:

This maple will prosper in full sun and acid soil but will also tolerate clay, loam or sand. It is pH adaptable, preferring a range of 6-7.5. It also tolerates drought, salt, air pollution and soil compaction and suffers from no serious pest or disease problems.

NATIVE HABITAT:
East China, Korea and
Japan

HARDINESS ZONE

5 to 8-9

A c e r g i n n a l a

AMUR MAPLE

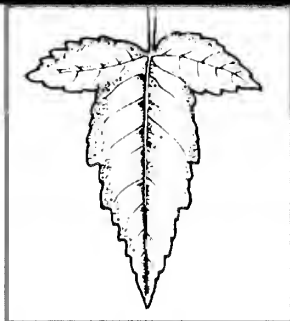
OUTSTANDING CHARACTERISTICS:

This slow-growing, small maple reaches an ultimate height of only 15 to 18 feet with an equal spread. In full sun the glossy, dark green leaves turn vivid yellows, oranges and reds in the fall. In the spring it is one of the first trees to leaf out. The flowers, although not showy, are extremely fragrant. In the winter the bark is a handsome gray-brown.

HARDINESS ZONE

3 to 8

Performs better in colder climates than in the South.



HABIT AND USE:

Often grown as a multiple-stemmed large shrub or small tree. Because of its extreme hardiness this tree is suitable for the most northerly sections of the United States. Besides cold, it tolerates shade, a variety of soils and a

RUTH SOUTER

wide pH range. It can easily be manipulated to specific landscape uses because it responds well to heavy pruning. Effective as a container specimen, as a patio tree, in masses for screening, as a foundation planting and in mixed tree and shrub borders under a canopy of light shade.

CULTURE:

The amur maple is pH adaptable, thrives in full sun or light shade and withstands heavy pruning.

NATIVE HABITAT:

Manchuria and Japan

A c e r g r i s e u m

PAPERBARK MAPLE

OUTSTANDING CHARACTERISTICS:

A truly outstanding small deciduous tree with unequalled ornamental bark. The trunk and stems glisten throughout the year with spectacular, exfoliating cinnamon-orange bark. In the winter it contrasts brilliantly with snow. The dark green, trifoliate leaves cast a light shade and develop excellent orange and red fall color. A slow-



JOANNE PAVIA

growing tree, it can reach 20 to 40 feet with a 15- to 25-foot spread.

HABIT AND USE:

At maturity the habit is oval to rounded. The colorful birch-like, exfoliating bark makes this tree a must in the winter

garden. Grown as a single specimen or in masses of three to five, it can be accented with a dark evergreen background. The ultimate size makes it suitable for patios or small courtyard plantings.

CULTURE:

Tolerates sun, shade and wind but not drought or other environmental stresses. Does best in well-drained loam with a pH of 5-7.

HARDINESS ZONE

5 to 8

NATIVE HABITAT:

Western and central China

A c e r p a l m a t u m

JAPANESE MAPLE

OUTSTANDING CHARACTERISTICS:

A tree for many seasons. In the spring and summer Japanese maples, which reach an ultimate height and spread of 15 to 25 feet, are adorned with elegant lobed, dark green leaves. In the fall the leaves turn variations of yellow, bronze, purple and red. In the winter the young twigs are shiny green or glaucous red to purple. The trunks are smooth and dark gray to black. The growth rate is moderate, averaging 12 to 18 inches per year. Many cultivars are available with different habits, leaf colors and shapes.

HABIT AND USE:

The artistic habit of the species is equally apparent in single- and multi-stemmed specimens. It ultimately attains a broad, rounded shape with an architectural, layered branching structure similar to that of the flowering dogwood. Japanese maples are effective as small specimen trees, accent plants, patio trees in dappled shade and, in large areas, massed multiple-stemmed trees. Like the trident

ROBERT M. HAYS



maple, they make excellent bonsai.

CULTURE:

The young foliage is sensitive to cold. Thrives in dappled shade; may burn in full sun. Prefers rich, moist soils but will tolerate chalk soils.

VARIETIES OR RELATED SPECIES:

'Bloodgood' — Reaches 15 to 20 feet tall. One of the best for retaining the deep reddish-purple leaf color throughout the growing season. Excellent red autumn color.

'Dissectum Atropurpureum' — A compact, sculptural habit with twisting, architectural

branches. Grows six to eight feet tall with up to twice the spread. The fernlike foliage begins purple-red, turns green by mid-summer and dazzling burnt orange in fall. One of the finest accent plants for all seasons.

'Sango Kaku' — A green-leaved form (see photo above) noted for its young stems which are a brilliant coral-red in the fall and winter. Grows to 20 to 25 feet with an equal spread.

NATIVE HABITAT:
Japan, Korea
and China

HARDINESS ZONE

6 to 8

Performs well in zone 8 where it develops good fall color in November.

A c e r r u b r u m

RED MAPLE

OUTSTANDING CHARACTERISTICS:

A successful shade tree over a broad geographic range, red maple grows 40 to 60 feet tall in cultivation. This fine specimen tree has vibrant fall color; the two- to four-inch long, dark green leaves turn brilliant shades of yellow and red. Better fall color and stronger wood than the ubiquitous silver maple, *Acer saccharinum*. The growth rate is 10 to 12 feet in five to seven years. In the wilds of northeastern North America, the red maple colors before the sugar maple. The flowers, though small, produce a rosy haze along the naked branches in spring.

HABIT AND USE:

In its youth its form is pyramidal to elliptical and eventually becomes rounded. Because of its good autumn color and extensive hardiness range the red maple is a good tree from the far north to the deep south. Effectively used as a shade tree in lawns, parks, campuses and in some street tree situations.

CULTURE:

Transplants readily as a small or large specimen. Grows in shade, but for best autumn color plant in full sun. Very tolerant of a variety of soils, it prefers slightly acid and moist

JERRY PAVIA



conditions. Tolerant of ozone but not highly polluted areas. Leaves will develop chlorosis in high-pH soils. Relatively pest and disease free. Cutting-grown plants are preferable, as grafted plants often develop incompatibilities as they age.

VARIETIES AND RELATED SPECIES:

'October Glory' — Reaches 40 to 50 feet tall with an oval-round habit. The lustrous, dark green leaves persist long into the fall and eventually turn a brilliant orange-red. In parts of the country that nor-

mally don't have good fall color this cultivar has exhibited fine color, particularly in the South.

'Red Sunset' — Develops orange to red fall color before 'October Glory'. It is pyramidal to round in outline. Grows 45 to 50 feet tall with a spread of 35 to 40 feet and makes a great street tree. Considered by many to be the best cultivar of red maple.

NATIVE HABITAT:

From Newfoundland to Florida west to Minnesota, Oklahoma and Texas

HARDINESS ZONE

3 to 9

A c e r s a c c h a r u m

SUGAR MAPLE

OUTSTANDING FEATURES:

Considered by many to be the "granddaddy" of trees for fall color, the sugar maple sets the autumn landscape ablaze with brilliant combinations of yellow, orange and red. This picturesque shade tree reaches 60 to 75 and up to 120 feet at maturity with a spread equal to two-thirds its height. In New England this tree is the source of sap for making maple syrup in late winter.

HABIT AND USE:

In its youth the habit is upright to oval becoming broadly rounded at maturity. Although somewhat intolerant of urban conditions its outstanding fall color and majestic habit make it still worth using as a street tree where road salt is not used excessively and as a specimen on larger properties. Effective as a shade tree in home landscapes, parks and campuses. The sugar maple is superior in every sense of the word to the Norway maple, *Acer platanoides*.

CULTURE:

Prefers well-drained, moderately moist and fertile soil. It is pH adaptable but will not tolerate salt, heat or compacted soils. It will grow in partial shade. The biggest problem

TIM BOLAND



with sugar maples is leaf scorch caused by drought.

VARIETIES AND RELATED SPECIES:

Subspecies *nigrum* — Has drooping leaf lobes and greater heat and drought tolerance, particularly in the Midwest.

'Green Mountain' — Heat-tolerant cultivar with dark green, leathery foliage that has good scorch resistance.

The fall color is yellow to orange to orange-red.

'Legacy' — Has a dense crown of thick, dark leaves turning to yellow-red or red in the fall. It is resistant to drought and is the superior cultivar in the South.

NATIVE HABITAT:
Eastern Canada to Georgia, Alabama, Mississippi and Texas

HARDINESS ZONE

4 to 8

A e s c u l u s x c a r n e a

RED HORSE CHESTNUT



ROBERT M. HAYS

PARENTAGE

pavia x *hippocastanum*

OUTSTANDING FEATURES

This deciduous tree reaches 20 to 40 feet tall with an equal spread. Spectacular in spring, when eight-inch clusters of scarlet flowers appear with the fresh new foliage. The leaves

are lustrous, dark green and palmately compound (like a hand). More resistant to leaf blotch than *A. hippocastanum*, whose leaves turn a rusty brown by mid-summer.

HABIT AND USE

Pyramidal when young, round-headed at maturity. Excellent as a flowering lawn specimen. Highly preferable to other horse chestnuts

because of disease resistance.

CULTURE

Grows in full sun to light shade, preferring moist, well drained, acid soil.

VARIETIES AND RELATED SPECIES

'Briotii' — Deeper red-colored and larger (ten-inch) flower clusters.

HARDINESS ZONE

5 to 8

NATIVE HABITAT:

Hybrid

A m e l a n c h i e r a r b o r e a **SHADBLOW, SERVICEBERRY, JUNE-BERRY**

OUTSTANDING FEATURES:

This is truly a tree for all seasons. A harbinger of spring, it is covered with two- to three-inch white flowers in late April. The newly appearing leaves have an elegant, glistening, wooly texture. In the summer the small fruits turn black and sweet and are quickly devoured by the nearest gardener or, more likely, the nearest flock of birds. In the fall the rounded leaves turn fiery tones of yellow, gold, orange and red. Winter highlights the attractive, smooth gray bark. Named for the bloom time coinciding with the shad run in New England.

HABIT AND USE:

Because of its suckering habit, it is most effective as a

HARDINESS ZONE

3 to 7

PAUL W. MEIER



multiple-stemmed plant grown in a clump, but it can also be grown as a small, single-stemmed tree. Its ultimate height is 6 to 20 feet. Especially appropriate in a native garden, including a bog garden (its native habitat is often boggy). Great for smaller properties, patio plantings, in masses or as a foundation planting.

CULTURE:

It will perform well in many soil types, but prefers full sun to shade and well-drained, acid soil. Grows in most situations and requires very little pruning. Occasionally it suffers from rust, fire blight and powdery mildew.

VARIETIES AND RELATED SPECIES:

'Cumulus' — A distinct upright-oval habit makes this useful as a street tree or a single-trunked specimen. Fleecy white flowers. Grows 20 to 30 feet tall with half the spread.
'Robin Hill' — A possible hybrid with pale pink flowers. Grows 20 to 30 feet tall with half the spread.

NATIVE HABITAT:

Maine to Florida
along the coast, west to Iowa

B a u h i n i a v a r i e g a t a **ORCHID TREE**

OUTSTANDING FEATURES:

Widely planted in southern Florida, this beautiful deciduous tree bears lavender to purple flowers that resemble small orchids in winter and early spring. Its distinctive two-lobed leaves resemble the print of an ox-hoof.

HABIT AND USE:

Growing to 20 feet tall with an umbrellalike habit, the medi-

RUH SOFES



um-sized flowering tree makes an excellent street, patio, lawn or park tree, planted as a single specimen or in groups.

CULTURE:

Will thrive in full sun and ordinary soil. Minimal maintenance is required. Some pruning is needed to shape or limit the size. Fertilizing helps in poor soils.

VARIETIES AND RELATED SPECIES:

'Candida' — Pure white, orchidlike flowers.

HARDINESS ZONE

10

NATIVE HABITAT:

China, India
and Burma

B e t u l a n i g r a

R I V E R B I R C H

OUTSTANDING FEATURES:

This species has attractive, exfoliating bark that reveals inner tints of gray-brown to cinnamon. A vigorous grower, it reaches 30 to 40 feet in 20 years and ultimately 40 to 70 feet with a spread of 40 to 60 feet. The dark green leaves can turn a good yellow in the fall. The stems are an attractive reddish brown.

HABIT AND USE:

Pyramidal when young, the canopy at maturity is open and rounded. The tree thrives in hot climates, can be used in very wet situations, is the most disease resistant of the



LARRY ALBERT

prefers moist soils with a pH of 6.5 or below. It may develop chlorosis in soils with a high pH. Resistant to the bronze birch borer which kills so many white-barked birches.

VARIETIES AND RELATED SPECIES:

'Heritage' — Selected for its outstanding bark which has white, tan, cream and peach-white tones. Beautiful every month of the year, this tree grows quickly to an effective landscape size. Best alternative to the short-lived birches. Winner of the Pennsylvania Horticultural Society Gold Medal Award.

HARDINESS ZONE
4 to 9

birches and is good for erosion control. Effective as a single specimen, in masses, in natural areas and as a street tree. Can be used as a single- or multiple-stemmed tree.

CULTURE:

Grows in sun. An adaptable tree, it tolerates heat but

NATIVE HABITAT:

Massachusetts to Florida, west to Minnesota and Kansas

C a l l i s t e m o n c i t r i n u s

L E M O N B O T T L E B R U S H

OUTSTANDING FEATURES:

This small evergreen tree grows 20 to 25 feet tall. It blooms throughout the year with two- to four-inch long spikes of red bottlebrushlike flowers at the ends of the branches. The heaviest flowering is December through March and throughout the summer. The small, narrow foliage smells of lemons when bruised.



RUTH SOTER

HABIT AND USE:

Makes a beautiful, fine-textured, small tree when trained for a treelike habit. At the northern edge of its hardiness range, plant it in a

tub or container and protect it in winter. Can be trained as a standard.

CULTURE:

Tolerates heat, some cold and adverse soils. Grows best in full sun.

VARIETIES AND RELATED SPECIES:

'Splendens' — Brilliant carmine-red flowers are twice as large as the species. 'Red Cascade' — Abundant rosy-red flowers.

HARDINESS ZONE
9 to 10

NATIVE HABITAT:
Australia

Carpinus caroliniana AMERICAN HORNBEAM, IRONWOOD

OUTSTANDING FEATURES:

This deciduous, native tree is grown for its smooth, tight, sinewy, slate-gray bark. A slow grower (one foot per year), it typically reaches 20 to 30 feet tall with an equal spread at maturity. The very dark green, oblong leaves turn yellow, orange and scarlet in the fall. The interesting pendulous clusters of fruit are eaten by many species of birds.

E. METERS



HABIT AND USE:

This highly adaptable tree is round in habit. Can be grown as a single- or multi-stemmed specimen. When grown with multiple stems it seems most fitting in a natural landscape. It can be used

as a medium-sized shade tree or understory tree where a tough, long-lived plant is desired.

CULTURE:

It prefers moist, rich, slightly acid soil but will tolerate drier soils, as well as periodic flooding. Grows in sun and heavy shade. Plant a container-grown or balled-and-burlaped specimen in the spring.

NATIVE HABITAT:

Nova Scotia to Minnesota and south to Florida and Texas

HARDINESS ZONE
3 to 9

Carya ovata SHAGBARK HICKORY

OUTSTANDING FEATURES:

A great North American native that should be more widely used in landscapes. This picturesque tree grows 60 to 80 feet, and has distinctive, attractive gray bark that flakes off in long, narrow plates. The compound, bright green summer foliage turns rich golden yellow with brown tones in fall. The fruit is edible and sweet.

PAUL W. MEYER



HABIT AND USE:

This beautiful upright tree with

a tall straight trunk makes an excellent specimen tree for the large landscape. Can be effective as a street planting. Good in a natural setting.

CULTURE:

It is adaptable to a wide range of soils but prefers well-drained, alluvial soils and full sun. Not susceptible to any major pest and disease problems, but can be difficult to transplant because of a deep tap root.

VARIETIES AND RELATED SPECIES:

Good fruiting cultivars are available.

NATIVE HABITAT:

Quebec to Minnesota, south to Georgia and Texas

HARDINESS ZONE
4 to 8

Celtis occidentalis

COMMON HACKBERRY

OUTSTANDING FEATURES:

This is a good hardy tree for the plains and prairie states. It withstands adverse conditions from extreme cold to open exposed areas to wet flood plains. It grows 40 to 60 feet and up to 100 feet with an equal spread. The lustrous green leaves turn yellow in the fall. The bark is gray with wartlike chunks along the trunk. The dark purple fruits attract birds and wildlife.

HABIT AND USE:

The mature crown is broad-



RUH SOFFER

topped with ascending branches. Attracts a variety of wildlife. A good specimen or street tree for the harshest of conditions. Highly adaptable and good for city plantings.

CULTURE:

It prefers rich, moist soils but

tolerates dry to heavy, sandy or rocky, acid or alkaline, wet or very dry soils, urban conditions and wind. It is susceptible to witches' broom, powdery mildew and hackberry nipple gall, which may disfigure but not harm the tree.

VARIETIES AND RELATED SPECIES:

'Prairie Pride' — Uniform, compact oval crown and thick, lustrous, dark green foliage with no witches' brooms. Rapid upright growth.

NATIVE HABITAT:

From Quebec to Manitoba, south to North Carolina, Alabama, Georgia and Oklahoma

HARDINESS ZONE

2 to 9

Cercidiphyllum japonicum

KATSURATREE

OUTSTANDING FEATURES:

This aristocrat is beautiful in every sense of the word. The new foliage has hints of reddish-purple and soon turns bluish green. In the fall the color is bright yellow with touches of apricot and brown. Foliage on some specimens has a distinct brown sugar odor on warm autumn days. This vigorous tree grows at least two feet per year, reaching an ultimate height of 60 to 100 feet with sometimes even greater spreads.



PAUL W. MEIER

HABIT AND USE:

Pyramidal when young, becoming broad-spreading as it matures. It is beautiful as a multiple-stemmed tree,

as a single specimen for a large area, as a single-stemmed tree for residential properties and parks and as a street tree.

CULTURE:

Grows in sun or part shade. Prefers rich, moist, well-drained soil. The best fall color occurs in an acid soil. Pest and disease free.

VARIETIES AND RELATED SPECIES:

'Pendula' — A graceful, weeping form growing to 25 feet.

HARDINESS ZONE

4 to 8

NATIVE HABITAT:

China and Japan

Cercidium floridum

PALO VERDE

OUTSTANDING FEATURES:

A small tree to 30 feet with an attractive, smooth, blue-green bark. The compound foliage is a handsome gray. Masses of striking yellow flowers are produced in four-inch long racemes April to July.

HARDINESS ZONE

9

KEN DRUSE



HABIT AND USE:

An excellent small-flowering specimen tree in arid regions.

CULTURE:

Needs heat and dryness. Best established when planted from a container.

NATIVE HABITAT:

Arizona, southern California and northwest Mexico

Cercis canadensis

REDBUD

OUTSTANDING FEATURES:

One of the most beautiful of the early spring-flowering trees. The small, one half-inch long flowers are reddish-purple in bud opening to rosy-pink with a purplish tinge, covering the naked black stems in March to April. The elegant heart-shaped leaves clothe the stems and in the fall turn a fine yellow. In six years it will grow seven to 10 feet. At maturity reaches 20 to 30 feet tall with a spread of 25 to 35 feet.

HABIT AND USE:

This small tree, single- or multi-stemmed, should have a place in every garden. It seems most fitting dotted along the edge of a native woodland, but does well in a mixed shrub border as a small understory tree. It

PAUL W. MEYER



branches close to the ground with ascending branches in an upright arching habit. Beautiful with the native flowering dogwood.

CULTURE:

Tolerates many soil types, acid or alkaline, and full sun or light shade but prefers moist, well-drained, rich soils. Little pruning is required. Canker and verticillium wilt can make it short-lived in some areas.

VARIETIES AND RELATED SPECIES:

Var. *alba* — An elegant white-

flowered form.

'Forest Pansy' — The new foliage is bright red fading to purple. An excellent foliage accent plant. Rose-pink flowers. *C. reniformis* 'Oklahoma' — A wine-red flowered selection with lustrous green foliage. Native from Texas to New Mexico, this is an excellent form for southern gardens.

NATIVE HABITAT:

New Jersey to north Florida, west to Missouri and Texas and northern Mexico

HARDINESS ZONE

3 to 9

Chilopsis linearis DESERT WILLOW, FLOWERING WILLOW

OUTSTANDING FEATURES:

This 20 foot tall deciduous tree has slender, one-inch long willowlike leaves. The fragrant, bell-shaped flowers are borne in short terminal racemes throughout the summer. Each individual flower is lavender to white with two yellow stripes in the throat.

HABIT AND USE:

Slender upright branches form a rounded crown. A use-



RUTH SOFFER

CULTURE:

It naturally grows in the dry parts of the Southwest. Thrives in sun. Best grown in sandy or well-drained soils. Withstands wind and tolerates drought and environmental stresses.

VARIETIES AND RELATED SPECIES:

'Burgundy' — Burgundy, trumpet-shaped flowers from spring through summer.

NATIVE HABITAT:

Texas, southern New Mexico and southern California to Mexico

HARDINESS ZONE

8

ful plant in warm and dry climates as a specimen or in group plantings. A good, tough, summer-flowering tree for arid areas.

Chionanthus virginicus WHITE FRINGETREE

OUTSTANDING FEATURES:

One of the finest spring-flowering trees. In May, before the leaves emerge, the plant is covered with six- to eight-inch long, fleecy panicles of flowers that are slightly fragrant. Reaches 12 to 20 feet at maturity with an equal spread. The leaves are bold, up to eight inches long, and turn golden in the fall. In August and September the black berries are borne in abundance, attracting birds to feast.

HABIT AND USE:

This broadly rounded small tree has a very open habit. Be patient: this is one of the last trees to leaf out in the spring. It can be grown as a single- or multiple-stemmed tree. It is



PAUL W. MITTS

suitable as a patio tree, in lawns, naturalized, in urban plantings or in masses.

CULTURE:

This very adaptable plant prefers deep, moist, acid, fertile soil in full sun to part shade. No pruning is required. In its native habitat it is often found along stream banks and swamps. Grows in wide pH range. Somewhat susceptible to leaf spot, canker and powdery mildew.

VARIETIES AND RELATED SPECIES:

Chionanthus retusus (Chinese fringetree) — This upright, rounded tree reaches a height of 15 to 25 feet. In May showy, fleecy white flowers cover the tree. Foliage is leathery and lustrous. Blue fruits borne August to October are very ornamental. Withstands urban conditions. Tolerant of heat. Native to China, Korea and Japan. Zone 6 to 8.

NATIVE HABITAT:

Southern New Jersey to Florida and Texas

HARDINESS ZONE

4 to 9

Chorisia speciosa

FLOSS-SILK TREE

OUTSTANDING FEATURES:

One of the showiest flowering trees for southern California. The large tubular flowers range in color from clear pink to dark magenta, appearing from September to February followed by capsules that pop open, releasing silky floss. The bright green trunk is studded with black spines, providing year-round interest. Reaches 40 to 60 feet with an equal spread.

HABIT AND USE:

This outstanding flowering tree is too big for the small garden. It makes a fine specimen tree for the large landscape, park or campus.

CULTURE:

Thrives in full sun. Will survive below freezing in well-drained soil with reasonable fertility. Best not to plant over a sidewalk, for the fleshy flow-

ers can be rather slippery when they fall.

VARIETIES AND RELATED SPECIES:

'Angel' — An elegant white-flowered form.

NATIVE HABITAT:
Brazil and Argentina



ROBERT M. HAYS

HARDINESS ZONE

9

Cinnamomum camphora

CAMPHOR TREE

OUTSTANDING FEATURES:

This architectural, broadleaf evergreen reaches 40 to 60 feet with an equal spread. The new growth is bronze-red, turning to lustrous dark green. In May the greenish white, fragrant flowers are borne in two- to three-inch long panicles. Very fast growing, ultimately 50 feet with an equal spread.



HABIT AND USE:

In youth it is round headed, maturing to wide spreading. It is a good, dense evergreen shade tree for warm climates.

The fruits can be messy, so be sure to site this plant where that won't be a problem. Use as a specimen or street tree.

CULTURE:

Prefers acid soil, sandy or clay loam. It will tolerate dry conditions. Leaves turn yellow when exposed to wind during cold weather. Susceptible to root rot and verticillium, though neither is serious.

HARDINESS ZONE

9 to 10

NATIVE HABITAT:
Japan and China

RUTH SOFFER

Cladrastis kentukea (*C. lutea*)

YELLOWWOOD

OUTSTANDING FEATURES:

A tree for all seasons. In spring the white flowers are borne in profusion in eight- to 14-inch long, drooping, fragrant, pendulous, wisterialike panicles. The compound, bright green leaves provide a fine texture in the summer and turn golden yellow in the fall. The winter bark is a beautiful smooth gray, similar to that of the American beech.

HABIT AND USE:

Reaching 30 to 35 feet with a spread of 40 to 55 feet, this tree has a very distinct upward vase shape. It is the perfect shade tree for any size property, especially when planted near patios and terraces.

CULTURE:

Prefers well-drained, rich soils that are slightly acid. It will bleed if pruned in the spring. Sometimes develops weak crotches which in turn affect the structural durability of the tree. It has no pest and disease problems.

VARIETIES AND RELATED SPECIES:

'Rosea' — Pink flowered form.

NATIVE HABITAT:

North Carolina to
Kentucky and Tennessee

HARDINESS ZONE

4 to 8



ROBERT M. HAYS

Cornus florida FLOWERING DOGWOOD

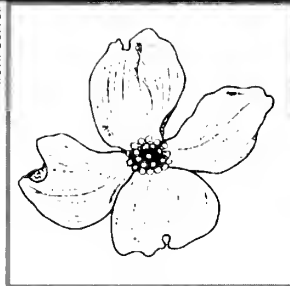
OUTSTANDING FEATURES:

An aristocrat of small, flowering trees. At maturity reaches 30 to 40 feet with an equal spread; typically, it reaches 20 feet. In April and May the tiny green flowers are surrounded by four white bracts that make up the showy part of the flower. The fall color is excellent, varying from red to purple. The glossy red fruits may be abundant and are very attractive.

HABIT AND USE:

The branching habit is flat-topped with picturesque spreading horizontal branches. In the landscape a combination of the white and pink bracted forms makes a daz-

RUTH SOFFER



zling spring display. Is also effective in natural gardens and patios, and in winter gardens because of its branching pattern and its bark which resembles alligator skin.

CULTURE:

Prefers acid, well-drained soil with organic matter, and partial shade. Not pollution tolerant. On the East Coast lower branch dieback caused by

anthracnose is devastating garden plants and wild stands. Borer can also be a problem.

VARIETIES AND RELATED SPECIES:

'Pluribracteata' — Creamy white, double-flowered form. 'Eddy's White Wonder' — Large-flowered cross between the native East and West Coast dogwoods (*florida* x *nuttallii*). Good for the Pacific Northwest. *C. x rutgersensis* — A new hybrid between *florida* x *kousa* that flowers midway between the two parents. Appears to be resistant to dogwood dieback.

NATIVE HABITAT:

Massachusetts to Florida, west to Ontario, Texas and Mexico

HARDINESS ZONE

5 to 9

Cornus kousa KOUSA DOGWOOD

OUTSTANDING FEATURES:

Kousa dogwoods provide ornamental interest throughout the year. In June the stalked flowers with creamy white bracts rise above the dark green foliage, covering the branches. The flowers persist for up to six weeks and fade to an attractive light pink. The fruits, which look like oversized raspberries, are abundant in August and September. The fall foliage is a striking red, purple or scarlet. The bark is stunning year-

PAUL W. MEYER



round: a mottled pattern of grays, tans and browns. This tree will reach 20 to 30 feet at maturity with an equal spread.

HABIT AND USE:

The habit is a distinct, bold, broad vase shape with good strong horizontal lines and a stunning winter silhouette. Use as an outstanding small

specimen tree, as a patio plant, to attract birds, in a winter garden or in masses in a large landscape.

CULTURE:

Prefers a pH of 4.5 to 6.4, acid, well-drained, sandy soil rich in organic matter, and a sunny location. It is more drought tolerant than the native dogwood. Does not do well in areas with high summer heat.

VARIETIES AND RELATED SPECIES:

'Milky Way' — A very floriferous and heavily fruiting selection. 'Summer Stars' — Blooms for six weeks. Red-purple fall color.

NATIVE HABITAT:

Japan, Korea and China

HARDINESS ZONE

4 to 8

Does not do well in southern heat.

Corylus colurna

TURKISH HAZEL

OUTSTANDING FEATURES:

Makes a picturesque medium-sized, deciduous shade tree with handsome summer foliage. At maturity it will reach 40 to 50 feet tall with a spread of one third to two thirds the height. In the spring it is covered with narrow, two- to three-inch long, pendulous, golden catkins. Valued for its winter interest, the bark flakes away, revealing tan, pale brown and orange-brown bark beneath.

HABIT AND USE:

A slow-growing tree with a broadly pyramidal habit at maturity, with branches that elegantly descend to the ground. It can be grown as a



single- or multi-stemmed tree. Effective as a specimen tree, patio tree, foundation planting and street tree. Very pest and disease free.

CULTURE:

Thrives in hot summers and

cold winters. Tolerates adverse conditions, including dry situations, heavy soil and wind. Plant in full sun.

HARDINESS ZONE

4 to 7

NATIVE HABITAT:

**Southeast Europe,
west Asia**

Cotinus obovatus

AMERICAN SMOKETREE

OUTSTANDING FEATURES:

In June and July masses of soft, six- to ten-inch long plumes of small, delicate green flowers are borne, creating a smokelike effect. Flowers turn a rosy color as the summer progresses. One of the best trees for fall color, the five-inch, obovate, blue-green leaves turn yellow,



orange and blazing red in autumn. The plated gray bark is pleasing in winter.

HABIT AND USE:

This handsome small tree will

reach 20 to 30 feet at maturity with a rounded head. Great in a native garden, it is equally at home in a city garden or a patio or as a lawn specimen.

CULTURE:

Grows in sun to part shade. Prefers well-drained, loamy, limestone soils. Tolerates wind, drought and compaction.

HARDINESS ZONE

5 to 8

NATIVE HABITAT:

**Southeastern
United States**

C r a t a e g u s c r u s - g a l l i

COCKSPUR HAWTHORN

OUTSTANDING FEATURES:

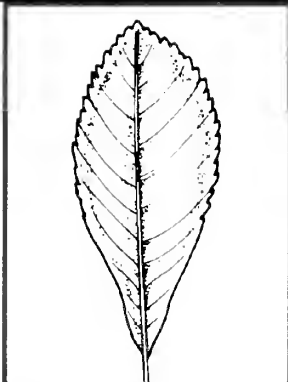
This small tree reaching 20 to 30 feet with an equal spread is appealing in every season.

For seven to 10 days in May it is covered with two- to three-inch wide clusters of white flowers. In the fall the narrow, glossy, dark green leaves turn bronze-red to purple. The deep red fruits become effective in September and last into the late fall and winter.

HABIT AND USE:

This broad-rounded, low-branched tree has very archi-

RUH SOTER



tectural spreading horizontal branches. Most cockspur hawthorns develop two-inch long thorns which can cause injury, so avoid planting in highly trafficked areas. Good

as a single specimen or in mass plantings, as a screen or hedge.

CULTURE:

Grows in full sun. Adaptable to many soils, pHs and city conditions. Susceptible to fire blight, rust, scab, powdery mildew, cedar hawthorn rust and leaf blotch miner, as are most hawthorns.

VARIETIES AND RELATED SPECIES:

Var. *inermis* — A thornless variety with the same features as the species.

NATIVE HABITAT:

Quebec to North Carolina and Kansas

HARDINESS ZONE

4 to 7

C r a t a e g u s p h a e n o p y r u m

WASHINGTON HAWTHORN

OUTSTANDING FEATURES:

A plant for all seasons, this is the last hawthorn to flower.

For seven to ten days in early June it is covered with two- to three-inch clusters of white flowers. In the fall the lustrous, dark green leaves turn orange to purple to scarlet.

The ornamental fruits ripen to a bright, glossy red in September and October and persist all winter. At maturity the tree reaches 25 to 30 feet with an equal spread.

PAUL W. MEYER



HABIT AND USE:

The habit is dense and rounded. Very thorny. Most effective as a single specimen or in masses, as a hedge or for screening. Provides winter interest in the garden.

CULTURE:

Adaptable to many soils, pHs and city conditions. Will tolerate windy conditions and poor soil. Susceptible to fire blight and cedar apple rust.

NATIVE HABITAT:

Virginia to Alabama and Missouri

HARDINESS ZONE

4 to 8

C r a t a e g u s v i r i d i s

GREEN HAWTHORN

OUTSTANDING FEATURES:

An outstanding small tree. In mid-May two-inch wide clusters of white flowers appear. In the fall the lustrous, dark green leaves turn to purple and scarlet. Its best attribute is its one quarter-inch fruits which ripen to an orange-red in September and persist throughout the winter. At maturity reaches 20 to 35 feet tall.

HABIT AND USE:

The habit is rounded, spreading to a vase shape. It makes a fine small specimen tree, or can be



LARRY ALBERT

planted in masses. An excellent plant for winter interest.

CULTURE:

Best in full sun. Tolerates city conditions and a variety of soils. Less susceptible to rust than the other hawthorns.

VARIETIES AND RELATED SPECIES:

'Winter King' — Outstanding for winter color when the

striking orange-red fruits are set off by the silver-gray bark which gets patches of orange-brown with age. Excellent specimen tree. Winner of the Pennsylvania Horticultural Society Gold Medal Award.

NATIVE HABITAT:

Maryland and Virginia to Florida and west to Illinois, Iowa and Texas

HARDINESS ZONE

4 to 7

E l a e a g n u s a n g u s t i f o l i a

RUSSIAN OLIVE

OUTSTANDING FEATURES:

Valued for its narrow, silvery foliage, this small, thorny tree reaches 12 to 15 feet tall with an equal spread. A durable plant in very cold climates. The undersides of the leaves are silver, giving the entire plant a silvery cast.

HABIT AND USE:

The silver-foliaged plant makes a good accent in a white garden. It is also effective as a hedge. Salt tolerant, it can be used along highways or the seacoast. Use with dis-



JOANNE DAVIS

cretion; can be invasive.

CULTURE:

Will tolerate any soil, sea-coasts, drought and alkaline conditions. Does well in full sun with a light sandy soil. Can be kept vigorous with occa-

sional pruning. Better in dry climates than in wet. Susceptible to verticillium and canker.

NATIVE HABITAT:

South Europe to west and central Asia and the Himalayas

HARDINESS ZONE

2 to 7

Eucalyptus ficifolia

RED-FLOWERING GUM

OUTSTANDING FEATURES:

The best of the red-flowered eucalyptus. Masses of red to pink flowers in six- to seven-inch clusters cover the tree in July and August. In California it blooms twice a year, spring and fall. Reaching 30 to 50 feet in height, this evergreen has six-inch, leathery, glossy green leaves.

ROTH SORFES



HABIT AND USE:

The tree has a dense habit with a rounded crown. It is very effective as a street

tree, windbreak or specimen, in groves or by the seashore.

CULTURE:

Withstands heat and drought although it prefers adequate water. Too much water and humidity, however, can cause physiological edema.

HARDINESS ZONE

9 to 10

NATIVE HABITAT:

West Australia

Evodia daniellii

KOREAN EVODIA, BEBE TREE

OUTSTANDING FEATURES:

A fine medium-sized, summer-flowering tree. This fast-growing tree reaches a height of 25 to 50 feet with an equal spread. The nine- to 15-inch long, compound leaves are fine textured. Small white flowers beloved by bees are borne in great profusion in four- to six-inch clusters from June to August. The ripening clusters of tiny fruit turn bright red and contrast nicely with the dark green foliage. The smooth gray bark is beechlike.

ROBERT M. NAYLOR



HABIT AND USE:

This broadly rounded tree grows well in the South, Midwest and East. It is very effective as a garden specimen,

shade or street tree. It is highly ornamental when few other trees are in bloom.

Adaptable to most soils and pHs. No serious pest and disease problems.

CULTURE:

Full sun. Prefers well-drained, moist, fertile soil.

HARDINESS ZONE

4 to 8

NATIVE HABITAT:

Northern China and Korea

F a g u s g r a n d i f o l i a

AMERICAN BEECH

PAUL W. HETTER



OUTSTANDING FEATURES:

An aristocrat among the big specimen trees. In cultivation it reaches 50 to 70 feet, but in the wild it may reach 100 to 120 feet with an equal spread. Its picturesque leaves are dark green in summer and turn golden bronze in the fall. In the winter the massive branches and smooth, silvery trunk are exposed.

HABIT AND USE:

In the southeastern United States the American beech outperforms the European beech. The sturdy, bold trunk and densely pyramidal, spreading crown make it one of the most splendid of all specimen trees for large properties, parks and golf courses. The only drawback is that little will grow in the dense shade it casts.

CULTURE:

It prefers moist, well-drained soil with a pH of 5 to 6.5. Prefers full sun but will grow in partial shade. It will not withstand wet or compacted soils and is susceptible to leaf spots, powdery mildew, bleeding canker and beech bark disease.

HARDINESS ZONE
3 to 9

NATIVE HABITAT:
New Brunswick to
Ontario, south to Florida
and Texas

F a g u s s y l v a t i c a

EUROPEAN BEECH

OUTSTANDING FEATURES:

Like the American beech, this elegant tree is slow growing with a very stately outline.

The leaves are somewhat rounded and lustrous dark green, turning golden brown in the fall. At maturity the tree reaches 50 to 60 feet tall by 35 to 45 feet wide. The smooth gray bark has been compared to elephant hide.

HABIT AND USE:

The habit is densely pyramidal to rounded. Space is

needed to show this tree off properly. Use as a specimen or as a park or campus tree. Also excellent as a clipped hedge.

HARDINESS ZONE

5 to 7

CULTURE:

Prefers moist, well-drained soil with a pH of 5 to 6.5. Full sun is required for best growth.

VARIETIES AND RELATED SPECIES:

'Asplenifolia' — A graceful cut-leaved form with a fern-like foliage that turns golden brown in fall.

'Atropunicea' — Striking new purple leaves in spring turn to purple-green in summer.

'Pendula' — A sculptural, weeping form.

NATIVE HABITAT:

Europe

JERRY PAVIA



F r a n k l i n i a a l a t a m a h a

FRANKLINIA

OUTSTANDING FEATURES:

A highly ornamental late-summer bloomer. It can reach as much as 30 feet tall, but usually is 10 to 20 feet with a spread of six to 15 feet. The bark is gray with white vertical striations. The obovate, five- to six-inch long leaves turn orange to red in the fall, and the autumn color persists quite late. In July and August the plant is covered with three-inch wide, white flowers with yellow centers, which resemble those of the

ROBERT M. HAYS



camellia, making franklinia a prized tree.

HABIT AND USE:

It is grown most effectively as a multiple-stemmed plant with an open, airy habit. Very effective in naturalized plantings, as a specimen in

small areas such as courtyards or in mixed borders.

CULTURE:

Best flowering and fall color in sun. Best planted in moist, acid, well-drained soil high in organic matter. Better in the north of its range than in the south. It will tolerate moderately alkaline soils. Susceptible to fusarium wilt.

NATIVE HABITAT:

Once native to the Altamaha River in Georgia, now extinct in the wild

HARDINESS ZONE

5 to 8

Fraxinus americana

WHITE ASH

OUTSTANDING FEATURES:

A beautiful tree in fall when the dark green, compound leaves turn shades of yellow, purple and maroon. Reaches 50 to 80 feet with an equal spread. The growth rate is moderate at one to two feet per year.

HABIT AND USE:

This ash is vigorous and suffers from very few pest and disease problems. In youth it is oval in habit, becoming round as it gets older. It makes an excellent shade, specimen or

HARDINESS ZONE

3 to 9



street tree. Superior ornamentally to the green ash.

CULTURE:

Performs best in deep, moist, well-drained soil in full sun. It is pH adaptable. May be susceptible to leaf rusts, leaf spots, cankers, ash borer, fall webworm and scale, but vig-

RUTH SOFFER

orously growing trees perform well.

VARIETIES AND RELATED SPECIES:

'Autumn Purple' — Pyramidal rounded outline. Reddish-purple fall color lasts for two to four weeks. Reaches 45 feet with a spread of 60 feet at maturity. 'Autumn Applause' — A densely branched oval form with reliable maroon fall color. Forty feet tall by 25 feet wide. 'Greenspire' — Narrow upright habit, with dark orange autumn leaf color.

NATIVE HABITAT:

From Novo Scotio to Minnesota, south to Florida and Texas

Fraxinus pennsylvanica

GREEN ASH

OUTSTANDING FEATURES:

This deciduous shade tree reaches 50 to 80 feet tall with a spread of 25 to 40 feet. The compound leaves turn a lovely yellow in the fall. It tolerates adverse conditions better than the white ash.

HABIT AND USE:

At maturity the habit is upright and spreading. Grows a vigorous two to three feet per year. It makes a very good street tree or

HARDINESS ZONE

3 to 9



shade tree. A good choice for the plains states. Best to grow seedless varieties.

CULTURE:

It will grow almost anywhere and tolerates high pH, salt, drought and poor soil. Does best in full sun.

RUTH SOFFER

Susceptible to the same problems as white ash.

VARIETIES AND RELATED SPECIES:

'Marshall's Seedless' — Glossy, dark green foliage turning yellow in the fall. Forty feet tall and seedless. More vigorous and less insect prone than the species. 'Dakota Centennial' — An extremely hardy, globe-shaped, seedless selection.

NATIVE HABITAT:

Novo Scotio to Monitobo, south to northern Florida and Texas

Ginkgo biloba **GINKGO, MAIDENHAIR TREE**

OUTSTANDING FEATURES:

This grand tree reaches 80 feet tall with a variable spread from 30 to 80 feet. The distinctive bright green, fan-shaped leaves turn a rich golden yellow in the fall.

HABIT AND USE:

The habit is pyramidal when young, becoming spreading and picturesque as the tree matures. An excellent city tree, it makes a great specimen tree, street tree and espalier. Be sure to get a male selection; the female fruits are

messy and malodorous.

CULTURE:

Grows in almost any situation, tolerating air pollution, a wide pH range and salt. Quite heat tolerant, it performs well in the South. Grows best in sandy, deep, moderately moist soil in full sun. It is pest and disease free.

VARIETIES AND RELATED SPECIES:

'Autumn Gold' — Broad conical male form, 50 feet tall and 30 feet wide, with beautiful golden fall color.

'Princeton Sentry' — A good upright male form, tapering to a narrow pyramid.

HARDINESS ZONE
4 to 9

NATIVE HABITAT:
Eastern China

PAUL W. MEYER



Gleditsia triacanthos var. *inermis* **HONEYLOCUST**

OUTSTANDING FEATURES:

This fine-textured tree produces very light shade. The bright green, compound leaves are six to eight inches long with very tiny leaflets that turn yellow in fall. Grows 30 to 70 feet with an equal spread.

HABIT AND USE:

The spreading crown makes a lovely silhouette. The growth rate is two feet per year. Bordering on overused, but it does make a good street tree or lawn tree because its light shade allows grass to grow all the way up to the trunk.

CULTURE:

Withstands a wide range of conditions but prefers rich, moist soils and full sun. A good urban tree as it tolerates drought, high pH and salt. Susceptible to cankers,

witches' brooms and webworm. Does not perform well in the South.

VARIETIES AND RELATED SPECIES:

'Continental' — A seedless selection with dark blue-green leaflets, a narrow crown and stout branches. Sixty to 70 feet tall.

'Imperial' — Thirty to 35 feet selection with spreading branches and rounded habit.

'Skyline' — Forty-five feet by 35 feet wide with strong growing, ascending branches. More upright than most.

NATIVE HABITAT:
From Pennsylvania to Nebraska and south to Texas and Mississippi

PAUL W. MEYER



HARDINESS ZONE
4 to 9

G y m n o c l a d u s d i o i c u s

KENTUCKY COFFEETREE

OUTSTANDING FEATURES:

Its elegant summer foliage and statuesque habit make the Kentucky coffeetree a grand tree. The compound leaves are 36 inches long and 24 inches wide with handsome bluish green leaflets and yellow fall color. A slow-growing tree, it will reach up to 90 feet tall with a spread of 40 to 50 feet. The nearly black trunks of male trees have an architectural outline that seems to have been made for the front of a haunted house.

HABIT AND USE:

Vertically ascending branches form an oval crown. An excellent tough tree for big lawns, city parks, campuses and golf courses. It makes a good specimen tree with summer texture and winter interest. Cleaning up the pods from the female trees can be a nuisance.

CULTURE:

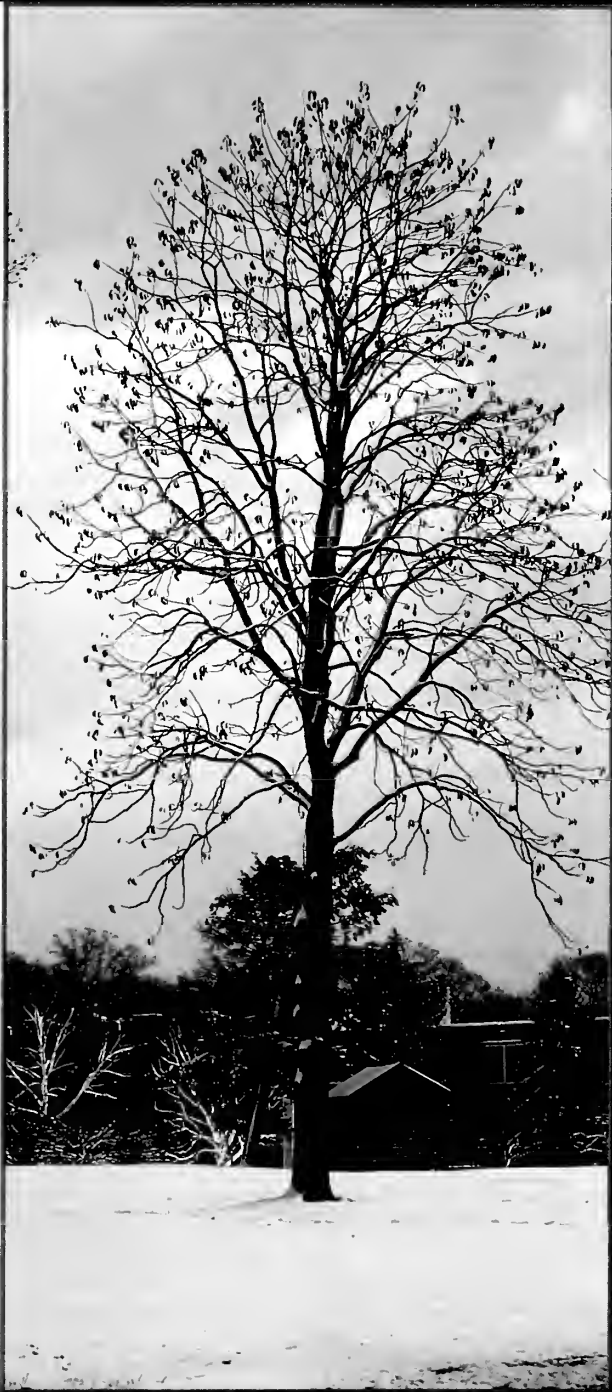
Prefers deep, rich, moist soils but adapts to a wide range of soils, drought and city conditions. Is not susceptible to any pest and disease problems. An undemanding, beautiful tree.

NATIVE HABITAT:

From New York to
Pennsylvania to
Minnesota, Nebraska,
Oklahoma and Tennessee

HARDINESS ZONE

4 to 8



ROBERT M. HAYS

Halesia tetraptera (*H. carolina*)

CAROLINA SILVERBELL

OUTSTANDING FEATURES:

This elegant tree is grown for its profusion of flowers in late April and early May. The white, bell-shaped flowers are one half to three quarter-inch long, in clusters of two to five. The tree will ultimately reach 30 to 80 feet by 20 to 25 feet. The bark is gray with white striations.

HABIT AND USE:

Can vary from a narrow head to a broad, rounded crown.

HARDINESS ZONE

5 to 8

RUTH SORFER



Tolerant of city conditions, it can be used as a specimen, patio or shade tree. Also excellent in the shrub and woodland border as a single- or multi-stemmed tree. Beau-

tiful when white flowers are set off by an evergreen background.

CULTURE:

Grows best in rich, well-drained, moist soil high in organic matter with a pH of 5 to 6; becomes chlorotic in soils with a high pH. Very pest and disease resistant. Prefers full sun or semi-shade.

NATIVE HABITAT:

From West Virginia to Florida to east Oklahoma

Hovenia dulcis

JAPANESE RAISINTREE

OUTSTANDING FEATURES:

The attractive, heart-shaped leaves of this deciduous tree are four to six inches long and glossy. The bark exfoliates in thin, narrow strips, revealing a rusty underside. In June and July the tree is covered with two- to three-inch wide clusters of white, sweetly fragrant flowers. At maturity this tree reaches 40 to 50 feet with two thirds the spread.

HABIT AND USE:

Makes a beautiful upright tree with a rounded crown at maturity. A perfect patio or small lawn tree that deserves wider use. As they mature in

ROBERT M. HAYS



the fall, the fleshy branches of the inflorescences become sweet like raisins and are valued by Oriental peoples.

of soil conditions, sun or shade and a wide pH range and tolerates wind.

HARDINESS ZONE

5 to 8

CULTURE:

Very adaptable to a variety

NATIVE HABITAT:

China

Ilex x attenuata

HYBRID HOLLY

PARENTAGE:

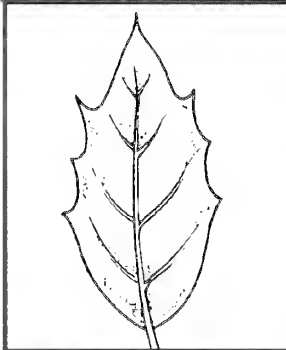
cassine x opaca

OUTSTANDING FEATURES:

This handsome group of hybrid hollies has dark green, narrow, evergreen leaves with slightly spiny margins. The abundant, deep red berries last throughout the winter. Grows 20 to 25 feet tall.

HABIT AND USE:

Valued for its fine texture and slender pyramidal habit, it is excellent as a specimen or for massing, hedging or screen-



PAUL W. MEIER

CULTURE:

Grows best in moist, loose, acid, well-drained soil in full sun or partial shade.

VARIETIES AND RELATED SPECIES:

'Foster #2' — The best of the Foster hybrids. Twenty to 25 feet tall with a narrow habit, dark green foliage and bright red fruits.

'East Palatka' — Bright red, one quarter-inch wide fruits in abundance. Looser habit than 'Foster #2', and less hardy for northern gardens.

HARDINESS ZONE

7 to 9

NATIVE HABITAT:

Hybrid

Ilex opaca

AMERICAN HOLLY

OUTSTANDING FEATURES:

This native evergreen holly has spiny, dark green, three-inch long leaves. The small red fruits ripen in September and last throughout the winter. On older specimens the bark is smooth and gray. At maturity will reach 40 to 50 feet tall with a spread of 18 to 40 feet.

HABIT AND USE:

The habit is densely pyramidal, becoming irregular and picturesque at maturity. Can be used for screening, massing, foundation plantings, hedges and cutting for holiday wreaths. A male plant is



PAUL W. MEIER

needed nearby for fruit production on the female plant.

CULTURE:

In Illinois the American holly has withstood temperatures of -20 to -25 degrees F. For best growth plant in moist, loose, acid, well-drained soil in part shade to full sun. Avoid dry winds and soils with a high pH. Susceptible to holly leaf miner, holly berry midge and scale.

VARIETIES AND RELATED SPECIES:

The cultivars of American holly are almost limitless. A few good ones are: 'Boyce Thompson Xanthocarpa' — A heavy-fruited, yellow-berried selection.

'Jersey Knight' — A male form with dark green leaves and a handsome habit. Good pollinator.

'Jersey Princess' — Female, with lustrous, dark green leaves, a handsome form and abundant red fruits.

'Old Heavy Berry' — Large, dark green leaves and heavy crops of dark red fruits.

NATIVE HABITAT:

From Massachusetts to Florida, west to Missouri and Texas

HARDINESS ZONE

5 to 9

Ilex vomitoria

YAUPON

OUTSTANDING FEATURES:

A very adaptable native evergreen for southern gardens. The one to two inch leaves of the Yaupon are small, lustrous and dark green. A fast grower, it reaches an ultimate height of 15 to 20 feet. The small scarlet fruits are borne in great quantities and last into the spring. Older trees can be limbed up to expose the white to grayish bark.

HABIT AND USE:

A fine-textured small tree. The mature habit is upright, irregularly branched and very picturesque. Very effective in the winter garden, as a screen or

hedge, in masses or as a topiary. It responds well to pruning.

CULTURE:

Very adaptable, it will withstand quite dry to extremely wet conditions and salt spray. Suffers from no pest and disease problems.

VARIETIES AND RELATED SPECIES:

'Shadows Female' — Dark green, with almost round leaves and bright red fruits. Excellent as a topiary.

RUTH SOFFER



HARDINESS ZONE
7 to 10

MONROVIA NURSERY CO.



NATIVE HABITAT:
From Long Island, New York, to central Florida and west Texas

Jacaranda mimosifolia

JACARANDA

OUTSTANDING FEATURES:

A good tree for southern California and Florida. Prized for its funnel-shaped, lavender-blue flowers borne in profusion in eight inch clusters from April to June. The doubly compound leaves are made up of many tiny leaflets, giving it a ferny texture. Grows to 50 feet tall.

RUTH SOFFER



HABIT AND USE:

This broadly rounded, spreading, medium-sized tree makes an excellent street,

lawn and park tree in the warm tropics. Briefly deciduous, it is a good choice where winter sun and summer shade is desired.

CULTURE:

Thrives in any well-drained soil in sun. Not salt tolerant. Responds well to pruning.

HARDINESS ZONE
10

NATIVE HABITAT:
Brazil and northwest Argentina

Koelreuteria bipinnata

CHINESE FLAME TREE

OUTSTANDING FEATURES:

This fast-growing tree reaches 30 to 40 feet at maturity. The large compound leaves are dark green and have good overall texture. Blooming later than most trees, it produces large showy panicles of fragrant yellow flowers from August to September, followed by papery capsules that turn rose-pink. These color-



ROBERT M. HAYS

spreading crown. A great, late-flowering small tree. Particularly useful for small gardens and patios.

CULTURE:

Grows best in full sun or filtered shade. It will withstand wind, drought, heat and air pollution and adapts to a wide range of soil conditions. No pest or disease problems.

HARDINESS ZONE

6 to 9

HABIT AND USE:

One of the few yellow-flowered trees, it has an open,

NATIVE HABITAT:

China

Koelreuteria paniculata

GOLDENRAIN TREE

OUTSTANDING FEATURES:

A fast-growing, summer-flowering tree reaching 30 to 40 feet with an equal spread. In July the very showy, 12- to 15-inch long, upright sprays of yellow flowers bloom, followed by attractive papery-brown seed capsules. The flowers make a bold contrast with the dark green, compound foliage which turns yellow, gold and orange in fall.

HABIT AND USE:

At maturity the habit is round to spreading. It could have some applications as a



PAUL W. MEIER

small street tree, but is best as a lawn or patio tree or specimen tree in a small gar-

den. Valued for its summer flowers and handsome foliage.

CULTURE:

Highly adaptable and useful in cities. Tolerates a wide range of soils. Withstands drought, heat, wind, alkaline soils and air pollution and has no serious pest and disease problems.

VARIETIES AND RELATED SPECIES:

'Fastigiata' — A strongly upright tree, reaching 25 feet with a six foot spread. Useful where a narrow flowering tree is desired.

HARDINESS ZONE

5 to 9

(perhaps 4)



RITA SOUTER

NATIVE HABITAT:

China, Japan, Korea

Lagerstroemia indica

COMMON GRAPE MYRTLE

OUTSTANDING FEATURES:

The summer-flowering crape myrtles are outstanding from July to September when the flowers are borne in six- to eight-inch long panicles of white, pink, purple and deep red. The smooth gray bark exfoliates into striking mosaic patterns of gray, brown and cream. A small tree, it can reach 15 to 25 feet in height.

HABIT AND USE:

The crape myrtles are most attractive as multi-stemmed trees used as patio or specimen trees, or in the back of a border. They take well to heavy pruning and can be made into a hedge. The exquisite bark makes them suitable for the winter garden. They thrive in the South, performing well in more northern areas.

Because they flower on new growth, they can be used as shrubs in colder areas where stems die back but the roots are hardy.

CULTURE:

Prefer well-drained soil and full sun. May be susceptible to powdery mildew, black spot, aphids, Florida wax scale.

ROBERT M. HALL



VARIETIES AND RELATED SPECIES:

L. fauriei — Exceptional rusty brown bark. Twenty- to 25-foot tall, multi-stemmed tree with white flowers. Fast growing. Zone 6.

The U.S. National Arboretum has introduced many mildew-resistant hybrids between *indica* x *fauriei* of varying heights and colors. Some good ones include:

'Muskogee' — Twenty-one feet tall by 15 feet wide with glossy green foliage that turns red in the fall. Profuse lavender to pink flowers in

four- to ten-inch long panicles from July through September. Mildew resistant. Shiny light gray to tan bark.

'Natchez' — Twenty-one feet tall by 21 feet wide. Dark cinnamon, sinuous, mottled, exfoliating bark. Dark green foliage turns orange to red in the fall. The pure white flowers are borne in six- to twelve-inch long panicles from June to September. Resistant to aphids.

HARDINESS ZONE

7 to 9

NATIVE HABITAT:

China and Korea

Liquidambar styraciflua

AMERICAN SWEETGUM

OUTSTANDING FEATURES:

This handsome street tree is best noted for its star-shaped, four- to seven-inch wide, lustrous dark green leaves that turn brilliant shades of yellow, purple and red in the fall. It can grow 60 to 120 feet tall with two-thirds the spread. The corky bark is picturesque in the winter.

HABIT AND USE:

The tree is densely pyramidal when young and rounded when mature. The growth rate is moderate. The dry, spiny, round fruits can be messy



RUH SOTTER

deep, moist, slightly acid soils in full sun. Does not do well in the city where the roots are constricted. Relatively pest free but may be susceptible to bleeding necrosis, sweetgum webworm, scale and chlorosis in high-pH soils.

VARIETIES AND RELATED SPECIES:

'Rotundiloba' — A fruitless cultivar with rounded, not pointed, dark green leaves that turn rich reddish purple to yellow in fall.

NATIVE HABITAT:

Fram New York, Ohio, Indiana, Illinois and Missouri south to Florida, Texas and Mexico

HARDINESS ZONE

6 to 9

when they fall from December to April. Excellent as a lawn, park or street tree in a suburban setting where the fruits won't be a problem. Needs room for root development. One of the best trees for fall color in southern California.

CULTURE:

Tolerant of a wide range of conditions, it performs best in

Liriodendron tulipifera

TULIP TREE

OUTSTANDING FEATURES:

A pyramidal tree when young, this aristocrat is one of the tallest of all shade trees, up to 150 feet at maturity. The bark is a beautiful smooth gray with striations. The three to four inch, yellow-orange, tulip-shaped flowers appear after the distinctive bright green leaves unfold. Fall color is buttery yellow.



JOANNE DAVIS

also be used as an overstory tree in a natural woodland. Not for the small garden.

CULTURE:

Prefers deep, moist, well-drained loam in full sun but is not fussy about pH. Do not plant as a street tree or near a driveway as aphids on leaves secrete a sticky "honeydew" which falls on cars.

HARDINESS ZONE

4 to 9

(withstood -25 degrees Fahrenheit in Minnesota)

HABIT AND USE:

Makes an excellent fast-growing, large shade, lawn, park or campus tree. It can

NATIVE HABITAT:

Massachusetts to Wisconsin, south to Florida and Mississippi

M a g n o l i a

PAUL W. METTER



The magnolias include some of the most magnificent of flowering trees. Their conspicuous, sweetly scented flowers are among the showiest in temperate areas. Many cultivars and hybrids are now available to gardeners, ranging from the ten- to 15-foot tall Little Girl Hybrids 'Ann', 'Betty', 'Jane', 'Judy', 'Pinkie', 'Randy', 'Ricki' and 'Susan' with late, pink to purple flowers to the glamorous 'Galaxy', a 20 to 30 foot, pyramidal tree with deep reddish purple flowers late in April.

Most magnolias have thick, fleshy root systems and are best transplanted in early spring. The following are some of the best ornamental species and hybrids.

M a g n o l i a d e n u d a t a

YULAN MAGNOLIA

OUTSTANDING FEATURES:

One of the most beautiful species, this tree is covered with fragrant, five- to six-inch wide, ivory, saucer-shaped blooms in early April, followed by five-inch long leathery leaves. The pewter-gray bark is handsome in winter.

HABIT AND USE:

Irregularly rounded in habit, it reaches 30 to 40 feet, with an equal spread. Easily grown as a single-stemmed plant.

HARDINESS ZONE

5 to 8



PAUL W. MEYER

Effective specimen, shade or lawn tree in the small garden.

CULTURE:

Prefers sun or some shade and rich moist soil. Does not tolerate extreme moisture or drought and hot, dry, windy areas.

VARIETIES AND RELATED SPECIES:

x 'Elizabeth' — A striking

yellow-flowered hybrid of *acuminata* x *denudata* developed by the Brooklyn Botanic Garden. The fragrant, creamy flowers, which appear in late April to May, withstand the late-spring cold. Fast growing, it flowers at a young age and grows rapidly to a rounded, 30 foot tree. Winner of the Pennsylvania Horticultural Society Gold Medal Award.

NATIVE HABITAT:

Central China

M a g n o l i a g r a n d i f l o r a

SOUTHERN MAGNOLIA

OUTSTANDING FEATURES:

This aristocratic broad-leaved evergreen is justly famous worldwide for its beautiful leaves and flowers. The lustrous, leathery, five- to ten-inch leaves are dark green above and reddish brown and pubescent below. The large, creamy white, fragrant flowers occur heavily in June and sporadically through the summer. The decorative fruits make good additions to Christmas wreaths.

HABIT AND USE:

This densely pyramidal magnolia reaches 60 to 80 feet at maturity with a spread of 30 to 50 feet. In the South it is an unequaled specimen tree. More



TIM BOLAND

northern gardeners should consider one of the hardy cultivars. Useful as a specimen, shade tree or a street tree (in warm climates), or for screening or espaliering (on a north or west wall in northern climates).

CULTURE:

Prefers rich, porous, acid, well-drained soil. In the North (Zone 7) choose a spot protected from winter wind and sun. Pest and disease free.

VARIETIES AND RELATED SPECIES:

'Edith Bogue' — The most

cold hardy of the cultivars (hardy in Montclair, New Jersey). Thirty feet tall by 15 feet wide, with a pyramidal habit. 'Hasse' — Noted for its dense, upright habit and lustrous, dark green leaves. Smaller than the species. Good for screening. Promising for Zone 6. 'Little Gem' — A small, 20-foot tall plant with smaller dark green leaves with rusty brown undersides. A heavy bloomer throughout the summer. Very compact. Not reliable in Zone 7. 'Samuel Sommer' — Rapidly growing 30 to 40 foot tree with large (ten to 14 inch) flowers. Best in Zones 8 and 9.

NATIVE HABITAT:

North Carolina to Florida and Texas

HARDINESS ZONE

7 to 9

M a g n o l i a x s o u l a n g i a n a

SAUCER MAGNOLIA



PARENTAGE:

denudata x *liliiflora*

OUTSTANDING FEATURES:

A popular magnolia, this beautiful flowering tree reaches 20 to 30 feet tall at maturity with an equal spread. The spectacular white or pink to rose-purple flowers cover the tree in early- to mid-April before the leaves appear. The bark is a handsome smooth gray. Fuzzy buds and architectural habit add winter interest.

HARDINESS ZONE

5 to 9

HABIT AND USE:

The broad-rounded tree is best grown as a multi-stemmed plant where the low branches can spread. Plant in masses or as a single specimen.

CULTURE

This fleshy-rooted tree prefers rich, porous, acid, well-drained soil in full sun. It is mostly pest and disease free. Sapsucker holes may disfigure bark but are not harmful to the tree. Flowers may be susceptible to late-spring frosts.

VARIETIES AND RELATED SPECIES:

'Alexandrina' — A free-flowering late variety with deep rose-pink flowers flushed white inside.

'Brozzonii' — An elegant, late, white-flowered cultivar.

'Lennei' — One of the latest and largest-flowered forms. Goblet-shaped rose-magenta blossoms in late April.

NATIVE HABITAT:

Hybrid

Magnolia tomentosa (*M. stellata*)

STAR MAGNOLIA

OUTSTANDING FEATURES:

The earliest magnolia to flower, this delicate small tree is covered with many-petaled, starry white flowers in early April before the four-inch leaves appear. At maturity it reaches 15 to 20 feet with an equal spread.

HABIT AND USE:

A useful early-flowering, densely rounded, multi-stemmed, large shrub or small tree. Effective in borders, foundation plantings, near a patio, as a lawn specimen or in



PAUL W. MITER

groupings. Beautiful underplanted with crocus or squills.

CULTURE:

Prefers sun to light shade with a rich, well-drained, acid soil. Will tolerate some wind and drought. Suffers from no pest and disease problems.

VARIETIES AND RELATED SPECIES:

'Rosea' — The pale pink-flow-

ered form of this lovely small tree.

'Royal Star' — Has fragrant white flowers that open later than the species. A handsome rounded plant.

M. x loebneri — A hybrid between *tomentosa* and *kobus*. Excellent small to medium tree. 'Merrill' is a beautiful fast-growing, 25 foot, broadly pyramidal cultivar with showy fragrant white flowers in early April. 'Leonard Messel' is covered with small blush-pink flowers in mid-April.

HARDINESS ZONE
5 to 6

NATIVE HABITAT:
Japan

Magnolia virginiana

SWEET BAY MAGNOLIA

OUTSTANDING FEATURES:

One blossom of this native tree fills the air with its perfume. The two to three inch, lemon-scented flowers appear in May to June and sporadically through the summer. In the North this tree is deciduous and reaches 15 to 25 feet tall with a spread of ten to 15 feet. In the South it is nearly evergreen and reaches 60 feet tall. The handsome five-inch long, oblong leaves are lustrous dark green above. When the wind blows the sil-



ROBERT M. HAYS

very white undersides flicker in the light.

HABIT AND USE:

This open upright tree can be grown as a single- or multi-stemmed tree. Excellent as a patio tree where the extremely fragrant blossoms can be

appreciated. Useful for wet sites and for small- to medium-sized gardens.

CULTURE:

Prefers sun to part shade and acid, loamy soils. Does well in wet, almost swampy conditions. It does not like dry situations and will become chlorotic in high-pH soils.

VARIETIES AND RELATED SPECIES:

The variety *australis* and the cultivar 'Henry Hicks' are both evergreen to Zone 6.

HARDINESS ZONE
5 to 9

NATIVE HABITAT:
Massachusetts to Florida
and Texas

C r a b a p p l e s

Technically, crabapples are apple trees with fruits less than two inches in diameter. They are valued for their great range of ornamental flowers, fruits and habits. All the crabs are deciduous and reach 15 to 25 feet tall. Their habits vary from low-mounding to upright or vase-shaped. Flowering occurs from April to early June, in colors ranging from white, pink and rose to carmine and red. Fruits are very ornamental and vary in color from deep red to golden yellow. Crabapples will thrive in a variety of soil conditions but prefer well-drained, moist, acid soil with a pH of 5 to 6.5 and full sun. Generally, they require little pruning, and all pruning should be done by early June before flower buds are set for the next year. The crabs are susceptible to a wide variety of pest and disease problems, including fire blight, cedar apple rust, apple scab, canker, scale, borers and aphids. Be sure to choose pest-resistant selections.

M a l u s f l o r i b u n d a
JAPANESE FLOWERING CRABAPPLE



OUTSTANDING FEATURES:

A picturesque, fragrant, flowering tree. The buds of this crab are deep pink to red, opening to one and one half inch white flowers in May. The three quarter-inch yellow

and red fruits are attractive to birds. Grows to 15 to 25 feet with an equal spread.

HABIT AND USE:

The broad-rounded, densely branched tree is beautiful planted in masses, as a lawn specimen or as a patio tree. The small, white-flowered

crabapple with showy fruits attracts wildlife.

CULTURE:

Slightly susceptible to scab and powdery mildew and moderately susceptible to fire blight.

HARDINESS ZONE
5 to 8

NATIVE HABITAT:
Japan

M a l u s h y b r i d s :

'CALLAWAY' — One of the best disease-resistant, white-flowered crabs for southern gardens. Buds are pink and open white, followed by persistent, large maroon fruits. Reaches 15 to 25 feet tall with a pic-

turesque rounded head. Slightly susceptible to mildew and fire blight.

'CENTURION' — Highly disease-resistant, pink-flowered crab. Red buds open rose-red, followed by glossy red fruits. The 25

foot tree with upright branching and a 15 to 20 foot spread is useful in small gardens and as a street tree.

'DONALD WYMAN' — One of the best fruiting crabs for winter interest. The

Malus hupehensis

TEA CRABAPPLE

OUTSTANDING FEATURES:

One of the most beautiful crabs. In May the picturesque armlike branches are covered with fragrant flowers. The deep pink buds open to white. The fruits begin yellow and turn red. They persist into late winter, providing food for flocks of cedar waxwings, robins and other birds. The

RUTH SOFFER



fall foliage color is yellow to copper. Grows to 24 feet with an equal spread.

HABIT AND USE:

The vase-shaped habit is very

architectural, with long branches reaching up and out from the trunk. Attractive year-round, it is an excellent specimen tree for the small or large garden.

CULTURE:

Tolerates wind and drought. Slightly susceptible to fire blight.

HARDINESS ZONE

4 to 8

NATIVE HABITAT:

China

Malus sargentii

SARGENT CRABAPPLE

OUTSTANDING FEATURES:

One of the smallest crabapples. The buds are red and open to one-inch wide, white, fragrant flowers in May. The fruit is bright red and attractive to birds. Grows to ten feet tall with a ten to 15 feet spread.

PAUL W. MEYER



HABIT AND USE:

The habit is dense-mounding

and wide-spreading. Effective in masses or singly in a shrub border or as a specimen where a small, shrubby tree is desired.

CULTURE:

Slightly susceptible to scab, fire blight and leaf spot.

HARDINESS ZONE

4 to 8

NATIVE HABITAT:

Japan

glossy, bright red fruits persist long into the winter. Pink buds open to single white flowers. A large spreading tree reaching 20 feet tall and 25 feet wide at maturity, it is resistant to scab, cedar

apple rust and fire blight and slightly susceptible to powdery mildew.

'RED JADE' — A graceful weeping variety introduced by BBG. Deep pink buds open to one and one half-inch white flowers

along the pendulous branches of this 15 foot tree. The attractive glossy red fruits are enjoyed by birds. Ideal for the small garden as an accent plant. Moderately susceptible to scab and powdery mildew.

N y s s a s y l v a t i c a
TUPELO, BLACK GUM, SOUR GUM



JOANNE PAVIA

OUTSTANDING FEATURES

One of the most picturesque of all the shade trees, this disease-resistant native is noted for its brilliant autumn color. The three- to six-inch long, lustrous leaves turn yellow to orange to brilliant scarlet early in the fall. Dark blue fruits are quickly eaten

by birds. The handsome bark looks like alligator hide.

HABIT AND USE

The habit is pyramidal when young and spreading with an irregular, flat-topped crown when mature. Thirty to 50 feet tall with a 30 foot spread. Excellent tree for naturalizing, or as a shade or specimen tree. Acceptable as a

street tree in residential but not heavily polluted areas.

CULTURE

Prefers moist, well-drained, deep, acidic soil. Tolerant of almost swampy conditions but not high pH. Will grow in full sun or shade.

NATIVE HABITAT:

From Maine to Ontario
and Michigan to Florida
and Texas

HARDINESS ZONE
3 to 9

Oxydendrum arboreum

SOURWOOD, SORREL TREE

OUTSTANDING FEATURES:

One of the most striking small trees for fall color. In cultivation it usually reaches 25 to 30 feet tall with a spread of 20 feet. The elliptic, lustrous, dark green leaves turn brilliant scarlet to purple in the fall. Also valued for its white, urn-shaped, fragrant flowers borne in June to July in ten-inch, drooping panicles in great profusion. The cream-colored persistent fruit capsules make a dazzling contrast with the vivid fall foliage.

HARDINESS ZONE

4 to 9

JERRY PAVIA



HABIT AND USE:

An upright tree growing 25 to 30 feet with a 20 foot spread. This small tree can't be beat for its outstanding blooms and fall color. Plant in a small garden, as a specimen tree or in a native garden.

CULTURE:

Prefers acid, moist, well-drained soil in full sun or partial shade. Best fall color occurs in full sun with a pH of 5.5 to 6.5.

NATIVE HABITAT:

From Pennsylvania and Ohio south to Florida, Mississippi, and Louisiana.

Pistacia chinensis

CHINESE PISTACHIO

OUTSTANDING FEATURES:

A tough, drought-resistant tree with good fall color for southern and desert gardens. At maturity this medium-sized tree reaches 35 feet tall with an equal spread. The compound ten-inch long, lustrous, dark green leaves turn a brilliant orange-red in fall. In the South this is the closest any tree gets to the fall color of sugar maples. The bark has touches of orange and salmon.

RUIN SOFFER



HABIT AND USE:

The growth rate is moderately fast. The mature habit is oval to rounded. This fine-textured tree makes a good small shade, patio, lawn,

foundation or specimen tree. Its tolerance of poor, droughty soils makes it a good candidate for urban situations.

CULTURE:

A very adaptable tree, tolerating a wide range of conditions. Thrives in moist, well-drained soils in full sun but tolerates drought. No pest or disease problems.

HARDINESS ZONE

6 to 9

NATIVE HABITAT:

Central and western China

Platanus x acerifolia

LONDON PLANE

PARENTAGE:

orientalis x *occidentalis*

OUTSTANDING FEATURES:

A tough shade tree with considerable winter interest. This large tree reaches 75 to 100 feet with an equal spread. Beautiful exfoliating bark reveals a mosaic of whites, tans, forest greens and grays. Foliage resembles large matte-green maple leaves.

HABIT AND USE:

Pyramidal when young, developing to a large, open, wide-spreading tree. Best used in open areas in parks and large landscapes where it can fully develop. Responds well to pruning. Highly tolerant of urban conditions, making it a popular street tree.

CULTURE:

Does best in full sun or light shade in deep, rich, moist, well-drained soils. Adaptable, tolerating high-pH soils, pollutants and very moist to dry city conditions. Anthracnose can cause defoliation; canker-stain can be serious.

VARIETIES AND RELATED SPECIES:

'Bloodgood' — An improved selection showing good resistance to anthracnose and tolerance of compaction, heat and drought. Fast growing, with dark green summer foliage.
P. occidentalis — This native is lovely growing along woodland edges and streamsides where its outstanding winter beauty can be appreciated. Its massive trunk has beautiful exfoliating bark revealing a ghostly mosaic of whites, tans and grays.



HARDINESS ZONE
5 to 9

NATIVE HABITAT:
 Hybrid

Populus deltoides

EASTERN COTTONWOOD

OUTSTANDING FEATURES:

This extremely fast-growing tree (up to four to five feet per year) reaches a height of 75 feet with a 50 foot spread.

Very winter hardy and recommended for the plains states.

The lustrous green leaves can show good yellow fall color in some areas. The tufted seeds have a cottony appearance.

HABIT AND USE:

Pyramidal in youth, spreading to vase-shaped at maturity. A weak-wooded, sometimes messy tree, this species is best suited for colder climates in the United States or for naturalizing along streams and river bottoms.

CULTURE:

Prefers moist soil but toler-

RUH SOFFER



ates dry soils with a wide pH range. The cottonwood is short-lived, rarely ever reaching 70 years old.

grows four feet per year. Canker resistant.

HARDINESS ZONE

2 to 9

VARIETIES AND RELATED SPECIES:

'Noreaster' (*deltoides* x *nigra*)
— A cottonless male that

NATIVE HABITAT:

From Quebec to North Dakota and south to Texas and Florida

Prosopis glandulosa

HONEY MESQUITE

OUTSTANDING FEATURES:

A drought-resistant native tree for southwestern gardens. The foliage is bright green and feathery. In November the honey mesquite is covered with yellow-orange flowers that are attractive to bees.

LEN BRUCE



HABIT AND USE:

A medium-sized tree, to 50 feet, with upright branches forming a symmetrical crown.

Makes a good specimen or patio tree for desert and semi-desert regions. Best to choose a thornless selection.

CULTURE:

Drought resistant. Will not survive temperatures below 0 degrees Fahrenheit.

HARDINESS ZONE


8

NATIVE HABITAT:

Texas, southeast Arizona, southern California and northern Mexico

O r i e n t a l F l o w e r i n g C h e r r i e s

CHRISTINE M. DOUGLAS



The flowering cherries are most beautiful in early spring when they produce their delicate single to double, pure white to deep rose flowers. There is a cherry for every garden situation, from the shrubby 'Hally Jolivette' to the narrow, upright 'Amanogawa' to the large, weeping *Prunus subhirtella*. The small fruits are inconspicuous, appearing after the leaves and quickly eaten by birds.

Cherries prefer full sun. They are susceptible to borers, scale and a variety of other insects and diseases, and are relatively short-lived. But those 50 or so years are filled with unequalled spring beauty.

Prunus x 'Okame'

OKAME CHERRY

PARENTAGE:

incisa x *campanulata*

OUTSTANDING FEATURES:

A first-class small flowering tree, this upright cherry reaches a mature height of 25 feet with a 15 foot spread. The dark red buds open to clear pink flowers, often at the end of March. After the petals drop the deep red calyx gives a rosy glow. The two-inch

WALTER HOLT



leaves turn yellow to orange to red in the fall. This fast-growing tree flowers at an early age. A Pennsylvania Horticultural Society Gold

Medal winner.

HABIT AND USE:

Upright and oval at maturity, the 'Okame' cherry makes a splendid small specimen, patio, foundation or street tree. One of the best and earliest flowering trees.

CULTURE:

Prefers well-drained, slightly acidic soil in full sun.

HARDINESS ZONE

5 to 8

NATIVE HABITAT:

Hybrid

Prunus serrulata

JAPANESE FLOWERING CHERRIES

PARENTAGE:

The important cultivars are hybrids of unknown parentage.

OUTSTANDING FEATURES:

The last cherries to flower, these trees are covered with single to double blossoms from mid-April to early May. The five-inch, elliptic, dark green leaves turn bronze, yellow and red in fall. These trees reach 20 to 35 feet with an equal spread.

CHRISTINE M. DOUGLAS



HABIT AND USE:

The mature habit is vase-shaped to rounded and spreading. These are ideal candidates for the small garden, patio and lawn as well as

street plantings. A memorable sight in spring.

CULTURE:

Prefers full sun to light shade and well-drained soil with adequate moisture. Susceptible to canker, borer, scale, tent caterpillar and ice storm damage.

VARIETIES AND RELATED SPECIES:

'Amanogawa' — A curious, narrow, 20-foot tall variety with a five-foot spread. Pale pink flowers in late April.

'Sekiyama' ('Kwanzan') —

The most popular and probably the hardiest of the double-flowering types. Bronze fall color. Rounded vase-shape at maturity. Deep pink blossoms in late April.

'Shirotae' — A beautiful white-flowered cherry with fragrant, semi-double blossoms in mid-April. A 20 to 25 foot tree.

'Shogetsu' — A small, rounded, 18 foot tree with blush-pink flowers in mid- to late-April.

HARDINESS ZONE

5 to 8

(depending on the cultivar)

NATIVE HABITAT:

Japan

P r u n u s s u b h i r t e l l a
HIGAN CHERRY



CARLINE M. DOUGLAS

OUTSTANDING FEATURES:

This species has produced many worthy cultivars with pink to white flowers in early to mid-April. The ultimate height is 20 to 40 feet with a spread of 15 to 30 feet. Does well in the East, Midwest and South.

HABIT AND USE

Wide-spreading and rounded to pendulous, depending on the cultivar. Best as a specimen, patio or small street tree, particularly where it can

be admired from a distance.

CULTURE:

This cherry prefers sun and good soil with adequate moisture and a pH of 5 to 7. May be susceptible to canker, borer, scale, virus and tent caterpillar.

VARIETIES AND RELATED SPECIES:

'Autumnalis' — Valued for its fall flowering, it produces pale pink to white flowers heavily in early April and again in the fall. A 20 to 30 foot, rounded tree.

'Hally Jolivette' — A small, 15 foot, rounded tree with double white flowers in mid-April. Ideal flowering tree for small

spaces. Hybrid *subhirtella* x *yedoensis*.

'Pendula' — Weeping Higan Cherry — This graceful weeping tree blooms in early April with one half-inch wide, single, pale pink flowers. At maturity reaches 20 to 40 feet tall with a spread of 14 to 30 feet.

'Yae-shidare-higan' — A graceful weeping form with double, dark pink, abundant flowers in early April that last longer and are deeper in color than those of 'Pendula'.

HARDINESS ZONE

4 to 8

NATIVE HABITAT:

Japan

Prunus x yedoensis

YOSHINO CHERRY

PARENTAGE:

serrulata x *subhirtella*

OUTSTANDING FEATURES:

The Yoshino is the aristocrat of the cherries, a big white cloud in the spring landscape. The mildly fragrant flowers are pink in bud and open pure white in late March or early April. At maturity it reaches 40 to 50 feet tall with an equal spread. This is the famous cherry that lines the Tidal Basin in Washington, D.C.

HARDINESS ZONE

5 to 8

ROBERT M. HAYS



HABIT AND USE:

Bold and broadly spreading, developing into a picturesque crown. An excellent lawn, park and specimen tree. Old street tree plantings survive in suburbs of Washington, D.C.

CULTURE:

Prefers sun or light shade, and clay or loam soil with adequate moisture and a pH of 5 to 7. May be susceptible to canker, borer, scale, virus and tent caterpillar.

VARIETIES AND RELATED SPECIES:

'Afterglow' — A handsome pink-flowered form with yellow fall color. Upright and spreading to 25 feet tall by 25 feet wide.

NATIVE HABITAT:

Hybrid

Pyrus calleryana 'Bradford'

BRADFORD CALLERY PEAR

OUTSTANDING FEATURES:

The Bradford pear has become one of the most popular, bordering on overplanted, small flowering trees. This fast-growing tree has a mature height of 30 to 50 feet with a spread of 20 to 35 feet. In late April to May it is covered with three inch clusters of white flowers. The leaves are dark, glossy green turning scarlet to purple in the fall. In the South fall color peaks in mid to late November.

HABIT AND USE:

Pyramidal in youth, becoming

HARDINESS ZONE

5 to 8

ROBERT M. HAYS



rounded with time. A good tree for streets, lawns and foundations. Do not choose this tree for areas where it is already overused and more diversity is needed. The Bradford pear has tight branch crotches which split in older trees; other cultivars may prove sturdier over time.

CULTURE:

Prefers full sun. Adaptable to a variety of soils, dryness, pollution. Relatively pest and disease free. Some tip dieback occurs in the South from fire blight.

VARIETIES AND RELATED SPECIES:

'Aristocrat' — Better branching angles than 'Bradford'. Yellow to red fall color. Heat and cold tolerant, but susceptible to fire blight. 'Red Spire' — Stiffly pyramidal with yellow fall color. Slower growing than 'Bradford'. Susceptible to fire blight.

NATIVE HABITAT:

The species is native to Korea and China

Q u e r c u s a g r i f o l i a **COAST LIVE OAK**

OUTSTANDING FEATURES:

An excellent native evergreen tree for California gardens. Dark, glossy, hollylike foliage is handsome all year long. Well adapted to wet winters and dry summers. Fifty feet tall with an equal spread.

HARDINESS ZONE

9



ALLEN HOWARD

sized tree. Valuable as a shade tree in gardens, parks and commercial landscapes.

CULTURE:

An adaptable tree, best planted in full sun. Ideal for gardens in the hills and valleys of coastal California.

NATIVE HABITAT:

Coastal California

HABIT AND USE

A round-headed, medium-

Q u e r c u s a l b a **WHITE OAK**

OUTSTANDING FEATURES:

The native white oak is a noble specimen throughout the year, with a particularly memorable winter silhouette. The lobed, four to eight inch leaves turn orange, red, violet or purple in the fall. As it matures, the bark breaks off, creating handsome patterns of gray. The acorns are eaten by various mammals. Slow growing to 50 feet with an 80 foot spread. At maturity it can be massive: The 400-year-old Wye Oak in Maryland is 95 feet tall with a 165 foot spread.

HABIT AND USE:

Very stately. When young the white oak is pyramidal, becoming broadly rounded with wide-spreading branches. Makes a magnificent specimen or shade tree.

HARDINESS ZONE

3 to 9



TIM BOLAND

CULTURE:

Grows in many types of soil. Does best in full sun in deep, moist, well-drained soil with a pH of 5.5 to 6.5. Usually durable, long-lived and pest and disease free.

VARIETIES AND RELATED SPECIES:

Q. bicolor — The swamp white oak grows to 50 to 60 feet with an equal spread.

Broad to rounded crown.

Grows naturally in low-lying swampy areas. Yellow to red-purple fall color. Native habitat ranges from Quebec to Georgia, west to Michigan and Arkansas. Good for naturalizing or as a shade tree.

NATIVE HABITAT:

Maine to Florida, west to Minnesota and Texas

Q u e r c u s i m b r i c a r i a

SHINGLE OAK

OUTSTANDING FEATURES:

An elegant, shiny-leaved oak. The six inch, oblong leaves are a lustrous, dark green, turning yellow to russet in the fall. At maturity the height is 50 to 60 feet with an equal spread. It is a very good oak for calcareous soils in the Midwest.

HABIT AND USE:

In youth the shingle oak is pyramidal, becoming upright

HARDINESS ZONE

5 to 8

JOANNE PAVIA



and oval and finally broad-rounded in old age. It can be

used as a shade, lawn, golf course, park and street tree. Can be pruned as a hedge or screen. Useful as a wind-break, as the leaves persist into the winter.

CULTURE:

Prefers moist, rich, deep, well-drained, acid soil and full sun. Tolerant of dry calcareous soils and city conditions.

NATIVE HABITAT:

From Pennsylvania to Georgia, west to Nebraska and Arkansas

Q u e r c u s m a c r o c a r p a

BUR OAK

OUTSTANDING FEATURES:

The bur oak, like the white oak, is picturesque. It is most handsome standing alone, particularly against the winter sky. The fall color is yellow to brown and not as brilliant as the white oak. The bur oak reaches 70 to 100 feet with an equal spread at maturity.

HABIT AND USE:

A very impressive large specimen tree. The crown rises from a stout straight trunk and is broad and open at maturity. Use as a single specimen to provide a large shade canopy. White tail deer, wood duck, turkey and squirrel all eat the acorns.

HARDINESS ZONE

3 to 8

PAUL W. MEYER



CULTURE:

Needs full sun. Difficult to transplant but adapts to a wide range of soils, from sandy plains to moist alluvial bottoms. Favors limestone soils; does well in dry, clay soils. The

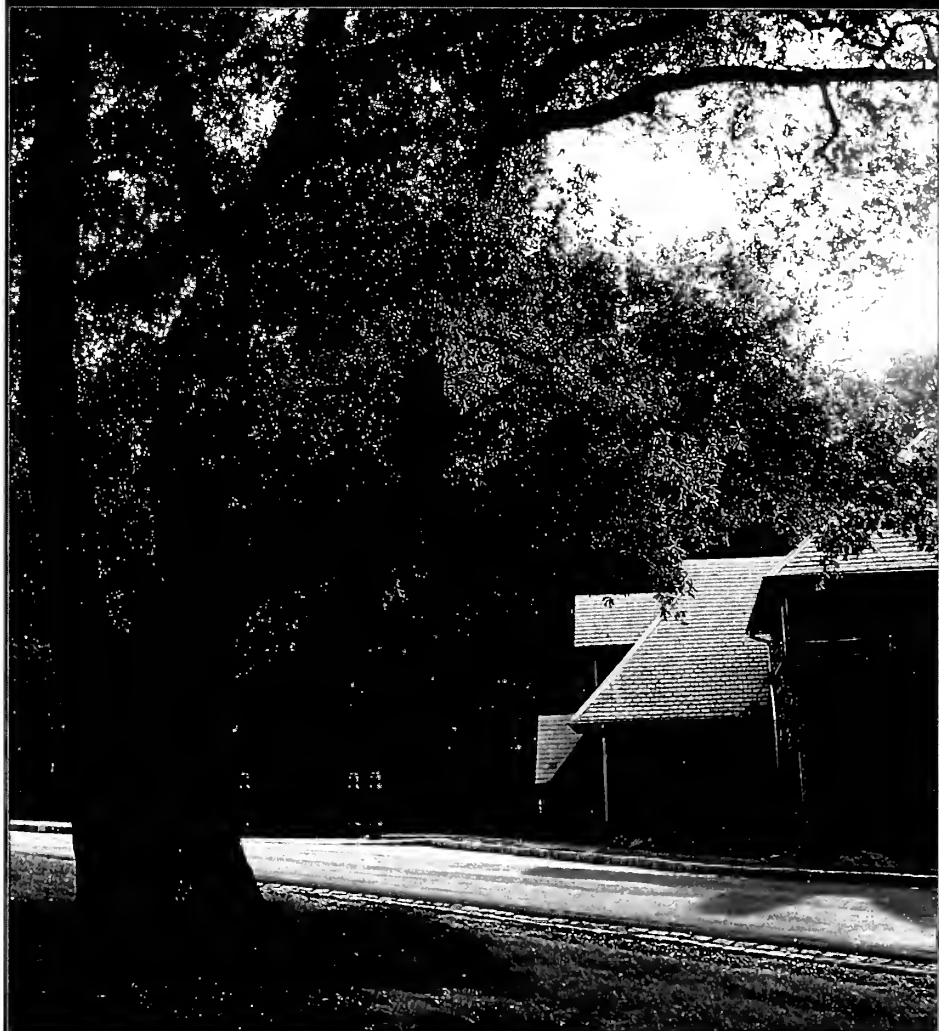
most tolerant of city conditions of all the oaks. No major pest and disease problems.

NATIVE HABITAT:

From Nova Scotia to Pennsylvania and west to Manitoba and Texas

Q u e r c u s p h e l l o s
WILLOW OAK

PAUL W. MEYER



OUTSTANDING FEATURES

A beautiful fine-textured oak. The narrow, five inch, willow-shaped, bright green leaves turn yellow to rusty brown in the fall. In cultivation this tree will reach 40 to 60 feet tall with a spread of 30 to 40 feet.

HARDINESS ZONE

6 to 9

Considered one of the best oaks for texture and form and ease of culture.

HABIT AND USE

Pyramidal in youth, becoming oval in maturity. Perfect shade tree for streets, lawns and parks. Because the leaves are small, relatively little raking is required in the fall.

CULTURE

Transplants more readily than other oaks. Prefers moist, well-drained soil but will tolerate a variety of conditions. Pest and disease free.

NATIVE HABITAT:

New York to Florida and west to Missouri and Texas

Q u e r c u s r u b r a **RED OAK**

OUTSTANDING FEATURES:

One of the best oaks for most parts of the United States. Grows a rapid two feet per year and ultimately reaches 60 to 75 feet with a spread of up to 100 feet. The dark green leaves turn red to bright red in the fall, exhibiting better fall color than the overplanted pin oak.

HABIT AND USE:

In youth the red oak is rounded, becoming broadly rounded at maturity. It is a great shade tree for lawns, streets, parks, campuses and golf courses and for naturalized plantings.

CULTURE:

Transplants readily. Does

RUTH SOTER



best in well-drained, acid, sandy loam in full sun. Will develop chlorosis in high-pH soils. Relatively pest and disease free.

NATIVE HABITAT:
Nova Scotia to
Pennsylvania, west to
Minnesota and Iowa

HARDINESS ZONE

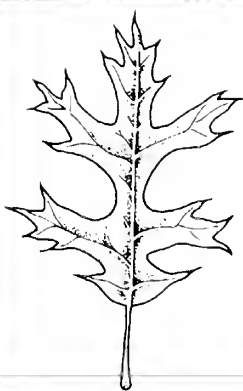
4 to 8

Q u e r c u s s h u m a r d i i **SHUMARD OAK**

OUTSTANDING FEATURES:

A handsome tree that tolerates tough conditions. The six inch, lustrous, deeply lobed green leaves turn bright red in the fall. The shumard oak is very drought resistant, making it a good choice for specimen tree plantings in Oklahoma and Texas. At maturity, reaches 40 to 60 feet with an equal spread. Performs better than the pin oak because it tol-

RUTH SOTER



rounded and spreading at maturity. A good shade tree for street, city, park and lawn.

CULTURE:

Best in sun. Extremely stress tolerant, growing in acid to alkaline, clay or sandy soils in wet and dry conditions. Some problems with oak wilt, but otherwise pest and disease free.

NATIVE HABITAT:
Kansas to south Michigan
to North Carolina, Florida
and Texas

HARDINESS ZONE

5 to 8

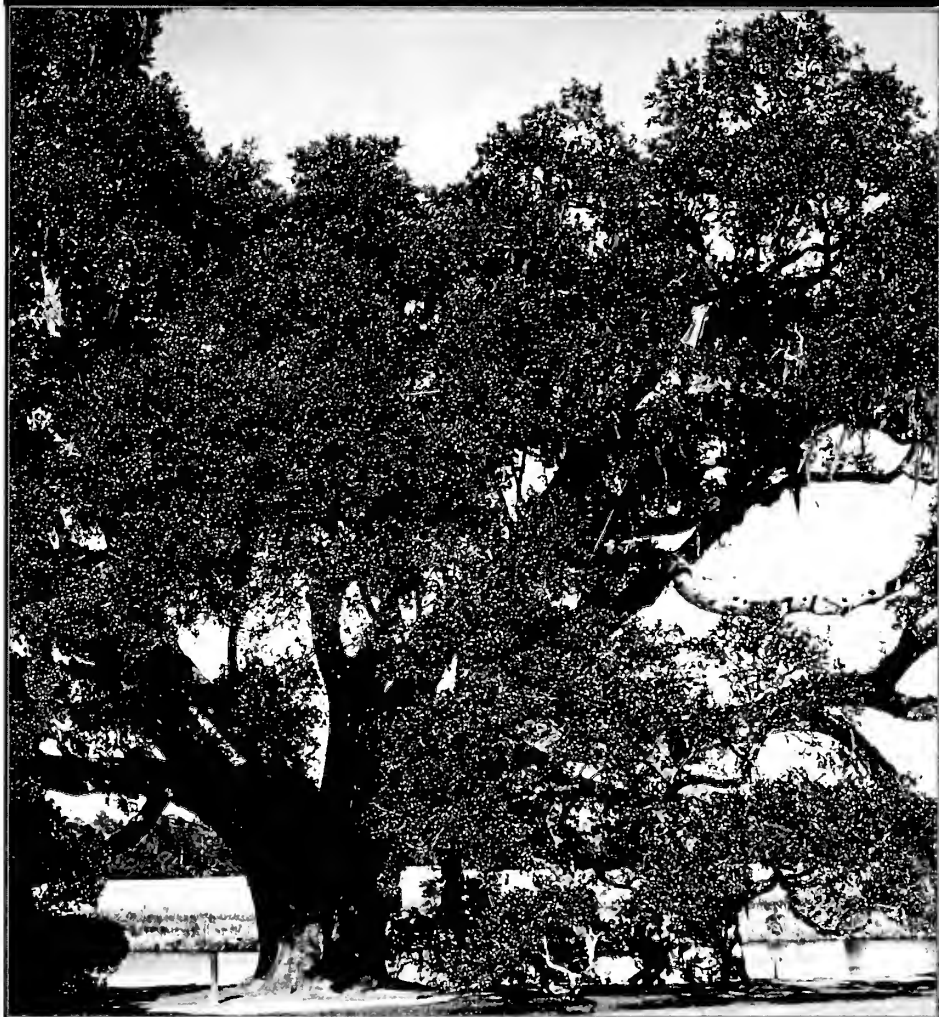
erates alkaline, clay soils.

HABIT AND USE:

Pyramidal in youth, becoming

Q u e r c u s v i r g i n i a n a
LIVE OAK

PAUL W. MEYER



OUTSTANDING FEATURES:

A magnificent shade tree for southern gardens. This ever-green oak has fine-textured, three-inch long, lustrous, dark green leaves. The broad-spreading tree has massive horizontal arching branches

that are often covered with Spanish moss. Grows 40 to 80 feet tall with a 60 to 100 foot spread.

HABIT AND USE:

Makes a splendid shade tree for large properties, campuses and parks. The acorns are eaten by quail, turkey, squirrel and deer.

CULTURE:

Grows in any type of soil. Useful as a street tree as it tolerates compacted soil and salt spray. Root rot can be a problem in coastal areas.

NATIVE HABITAT:

Virginia to
Florida,
west to Mexico

HARDINESS ZONE

8 to 10

Salix babylonica **BABYLON WEeping WILLOW**

OUTSTANDING FEATURES:

The leaves of the Babylon weeping willow are very narrow, giving this tree an extremely delicate texture. This, in addition to its weeping habit, make the tree a fine architectural specimen in the landscape. At maturity it reaches 30 to 40 feet tall with an equal spread.

HABIT AND USE:

This willow has a short trunk with graceful weeping branches that sweep to the ground. Best used in very moist areas near rivers or ponds, not in areas where water is in short supply. The fast-growing

JERRY PAVIA



species is not hardy in New England.

CULTURE:

Thrives in moist soils and is pH adaptable. Susceptible to twig blight, canker, powdery mildew and several insects.

Also susceptible to ice and wind damage. A greedy water user, this tree should not be used in low-rainfall areas.

HARDINESS ZONE

6 to 8

NATIVE HABITAT:

China

Sassafras albidum **SASSAFRAS**

OUTSTANDING FEATURES:

A handsome native tree with bright green three-lobed, mitten-shaped leaves that turn fantastic shades of yellow, orange, scarlet and purple in the fall. The stems are an attractive bright green in autumn. At maturity the sassafras can reach 30 to 40 feet tall with a spread of 25 to 40 feet.

HABIT AND USE:

Pyramidal and irregular in

TIM BOLAND



youth, becoming flat-topped and oblong at maturity. Grows stoloniferously, therefore expansive colonies can form. Great for native plant-

ings, stabilizing soils and small gardens.

CULTURE:

Grows in full sun to part shade. Prefers moist, loamy, acid, well-drained soil. May develop chlorosis in high-pH soils. No pest or disease problems. Remove suckers if a single trunk is desired.

NATIVE HABITAT:

Fram Maine to Ontario and Michigan, south to Florida and Texas

HARDINESS ZONE

4 to 9

S o p h o r a j a p o n i c a
JAPANESE PAGODATREE, SCHOLAR TREE

OUTSTANDING FEATURES:

One of the best summer-flow-
 ering trees. The creamy white
 flowers are borne in 12-inch
 long terminal clusters from
 July through August. They
 are followed by showy, bright
 green pods. At maturity this
 tree is 50 to 75 feet tall with
 an equal spread. The com-
 pound foliage gives it an over-
 all fine texture.

HABIT AND USE:

The habit is broad and round-
 headed and spreading at



maturity. Tolerates city condi-
 tions and poor soil, making it
 suitable for the suburban
 landscape or for use as a
 street tree.

CULTURE:

Grows in sun to part shade in

average soils. Tolerates heat
 and drought, and pollution.
 Prune in fall.

VARIETIES AND RELATED SPECIES:

'Princeton Upright'— A com-
 pact, upright form growing to
 40 to 50 feet. Good where
 spread must be limited.
 'Regent' — Selected for its
 fast growth rate, oval crown
 and glossy, deep green
 leaves. Flowers early, at six to
 eight years.

HARDINESS ZONE

5 to 8

NATIVE HABITAT:

China and Korea

S o p h o r a s e c u n d i f l o r a
TEXAS MOUNTAIN LAUREL, MESCAL BEAN

OUTSTANDING FEATURES:

An excellent native flowering
 tree for southwest gardens.
 This evergreen has thick, lus-
 trous, dark shiny green com-
 pound leaves. The very fra-
 grant violet-blue flowers are
 borne in wisterialike clusters in
 March to April. In cultivation
 this tree reaches 15 to 25 feet
 tall. The fruit is a bright red
 pod that matures in September.

HABIT AND USE:

A small, upright, dense tree
 attractive for street plantings
 or in the small garden as a
 specimen or espaliered.



CULTURE:

Prefers sun to moderate
 shade and alkaline soils with
 good drainage. Tolerates
 drought and air pollution but

not soil compaction. No pest
 or disease problems.

HARDINESS ZONE

8 to 10

NATIVE HABITAT:

Texas, New Mexico and
 Mexico

Sorbus alnifolia
KOREAN MOUNTAIN ASH

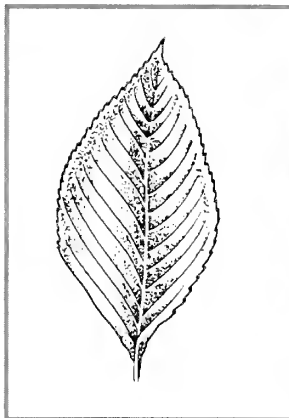
PAUL W. MEYER



OUTSTANDING FEATURES:

A tree with year-round interest. In May the plant is covered with white, flat-topped flower clusters. In September its showy berries turn from pinkish red and orange to scarlet and persist until the lustrous, dark green, oval leaves turn a warm orange to red. On mature trees the ultimate height is 40 to 50 feet tall with a spread of 20 to 30 feet. The smooth beechlike bark is attractive in winter.

RTUN SOFFER



HABIT AND USE:

Pyramidal when young and oval at maturity. A handsome small specimen tree with showy flowers and impressive autumn color.

PAUL W. MEYER



CULTURE:

Grows best in sun in well-drained soil. Tolerates a wide pH range, wind and wet conditions but not air pollution. Least susceptible of the mountain ashes to borer.

NATIVE HABITAT:

Central China, Korea and Japan

HARDINESS ZONE

4 to 7

Grows well in Minnesota

Sorbus aucuparia EUROPEAN MOUNTAIN ASH

OUTSTANDING FEATURES:

A handsome small tree with compound, dark green leaves that turn shades of yellow, red and purple in the fall. In May three to five inch, flat-topped clusters of white flowers are borne, followed by showy orange-red fruits in the fall. Because European mountain ash is susceptible to a host of diseases in warm areas, it should be grown only in northern climates. At maturity this tree reaches 20 to 40 feet tall.

HARDINESS ZONE
3 to 6



HABIT AND USE:

The upright oval tree can be an excellent fruiting, flowering and fall-color tree for northern areas. Good with an evergreen background to set off the fruit and fall foliage.

CULTURE:

Prefers well-drained loam. Does not do well in polluted areas. Susceptible to canker, borer, fire blight, rust, scab and aphids. Short-lived in areas with warm summers.

VARIETIES AND RELATED SPECIES:

'Apricot Queen' — Apricot-colored fruit.
'Cardinal Royal' — Vigorous grower with brilliant red fruits.
'Xanthocarpa' — Yellow fruits.

NATIVE HABITAT:
Europe, west Asia and Siberia

Stewartia pseudocamellia JAPANESE STEWARTIA

OUTSTANDING FEATURES:

A summer-flowering tree with unbeatable winter interest. The bark is smooth, sinuous and exfoliating, leaving mottled patches of rust, cream, greens, gray, brown and terracotta. At maturity the tree reaches 20 to 40 feet. In July the two and one half-inch, camellialike flowers occur over a two week period. The elliptic leaves turn wine-red to purple in the fall.

HABIT AND USE:

Pyramidal to oval at maturity.

HARDINESS ZONE
6 to 7



For the small garden there is no better choice. Makes a great patio or small specimen tree for any landscape.

CULTURE:

Grows in sun to part shade. Prefers moist, acid soil with a pH of 4.6 to 6.5. Does not tolerate environmental stresses. No major pest or disease problems.

VARIETIES AND RELATED SPECIES:

S. pseudocamellia var. *koreana* — More open, with larger flowers than the species. Bright yellow to orange-red fall color. A Pennsylvania Horticultural Society Gold Medal Plant.

NATIVE HABITAT:
Japan

Styrax japonicus
JAPANESE SNOWBELL

PAUL W. MEYER



OUTSTANDING FEATURES:

This elegant small flowering tree produces pendulous, mildly fragrant white flowers in May to June. The oval, tapering, rich green leaves turn yellow in the fall. Grows 20 to 30 feet with an equal spread.

HABIT AND USE:

This graceful, low-branched, rounded small tree makes a fine patio, foundation and small specimen tree. Plant where you can look up into the canopy when in flower.

PAUL W. MEYER



CULTURE:

Grows in sun and part shade in zones 7 and 8. Thrives in loamy, light, well-drained soil high in organic matter with a pH of 5 to 7.

VARIETIES AND RELATED SPECIES:

'Pink Chimes' — Upright habit, with pink flowers.
'Pendula' — A graceful weeping form.

HARDINESS ZONE
5 to 8

NATIVE HABITAT:
China and Japan

Styrax obassia FRAGRANT SNOWBELL



PAUL W. MEIER

OUTSTANDING FEATURES:

Flowering before *Styrax japonicus*, the fragrant snowbell has fragrant white flowers borne in long, drooping clusters in May to June. The handsome habit and smooth gray bark are good for winter effect. At maturity this tree reaches 20 to 30 feet.

HABIT AND USE

The broad spreading tree with dense ascending branches should be planted close to pathways or entrances to the home where the fragrant flowers can be enjoyed. A beautiful specimen tree.

HARDINESS ZONE
5 to 8



PAUL W. MEIER

CULTURE

Does best in full sun to light shade, in acid, well-drained, moist, rich soil. No pest or disease problems.



PAUL W. MEIER

NATIVE HABITAT:
Japan

Syringa reticulata JAPANESE TREE LILAC

OUTSTANDING FEATURES:

A small tree valued for its summer flowers, this lilac blooms later than most and is not as susceptible to disease. The flowers are borne in 12-inch long creamy white panicles in May in the South, June in New England and July in the Midwest. Attractive shiny, cherrylike bark adds winter interest. At maturity this lilac reaches 30 feet with a spread of 15 to 29 feet.

HABIT AND USE:

The erect rounded plant is best

ROBERT M. HAYS



as a specimen or small street tree. Also effective in masses.

CULTURE:

Will tolerate drought but thrives in sun, slightly acid, well-drained soil. Susceptible to scale and borer. Prefers cool summers.

VARIETIES AND RELATED SPECIES:

'Ivory Silk' — Flowers at a young age. A compact, dense, heavy-flowering plant.
'Summer Snow' — Creamy white, very profuse flowers.

NATIVE HABITAT:

Japan

HARDINESS ZONE

4 to 7

Tabebuia chrysotricha GOLDEN TRUMPET TREE

OUTSTANDING FEATURES:

This deciduous, sometimes evergreen tree grows four to five feet per year and reaches 30 to 50 feet tall. The dazzling bright yellow, trumpet-shaped flowers are borne in clusters in late March through April. The fruit is a long brown bean that persists in winter.

JERRY PAVIA



HABIT AND USE:

The open spreading tree is spectacular in flower during late winter to early spring. Excellent as a specimen tree

for gardens and a street tree in zone 10.

CULTURE:

Thrives in rich loam and sun. Tolerates light or heavy soils and drought.

VARIETIES AND RELATED SPECIES:

Tabebuia impetiginosa 'Pink Cloud' — Brilliant deep pink flowers in late winter to early spring.

NATIVE HABITAT:

Brazil, south Florida, Colombia and Mexico

HARDINESS ZONE

9

Tilia cordata LITTLELEAF LINDEN



PAUL W. MEIER

OUTSTANDING FEATURES:

This vigorous shade tree has a good shape. Its distinctive heart-shaped foliage is dark green turning yellow in the fall. Inconspicuous flowers perfume the air in late June.

HARDINESS ZONE
3 to 7

HABIT AND USE:

The habit is pyramidal to oval at maturity. An outstanding street or shade tree for lawns, planters, parks and malls. It can also be trimmed as a hedge. Grows as far north as Manitoba, Canada.

CULTURE:

Prefers full sun and well-drained fertile soils. A tough city tree

that is pH adaptable and pollution tolerant. Aphids and Japanese beetles can be a problem.

VARIETIES AND RELATED SPECIES:

'Greenspire' — Maintains a single leader with strong branching. Does well under difficult conditions. Dark green foliage.

NATIVE HABITAT:
Europe

Tilia x euclora CRIMEAN LINDEN

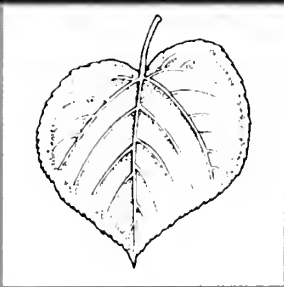
PARENTAGE:

cordata x dasystyla

OUTSTANDING FEATURES:

This graceful hybrid is less stiff in habit than the littleleaf linden. The lustrous, dark green leaves turn yellow-green in fall. At maturity it reaches 40 to 60 feet tall with one half the spread.

HARDINESS ZONE
3 to 7



HABIT AND USE:

The lower branches skirt the ground, giving this tree a very graceful habit. Like littleleaf linden, it is excellent

for street, park, lawn and specimen plantings.

CULTURE:

Grow in full sun. Tolerant of hot, dry conditions and pollution.

VARIETIES AND RELATED SPECIES:

'Redmond' — A very hardy popular selection in the Midwest. Densely pyramidal, growing to 50 feet.

NATIVE HABITAT:
Hybrid

RUTH SOFFER

T i l i a t o m e n t o s a
SILVER LINDEN

OUTSTANDING FEATURES:

A beautiful specimen tree that reaches 50 to 70 feet with two thirds the spread at maturity. The leaves are dark green above and silver below, giving the tree a shimmering appearance when the wind blows. The fall color is a good yellow. The yellow-white flowers are inconspicuous but highly fragrant in early summer.

HABIT AND USE:

Pyramidal to oval at maturity. A very good shade tree in home gardens, parks, golf courses and commercial landscapes.

CULTURE:

Grows in sun in average soil. Tolerates wind, salt and air pollution. Somewhat susceptible to aphids, but shunned by Japanese beetles.

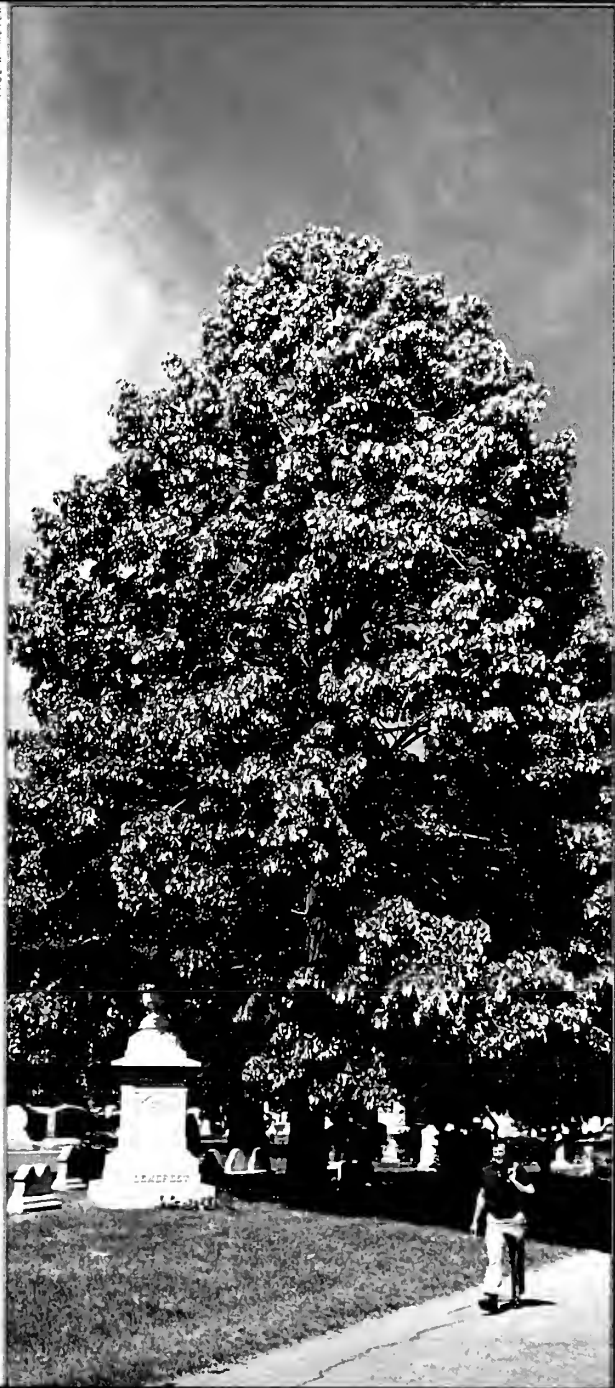
VARIETIES AND RELATED SPECIES:

Tilia petiolaris — Closely allied species with graceful pendulous branches that sweep the ground. An outstanding large specimen tree.

NATIVE HABITAT:
Southeast Europe and
west Asia

HARDINESS ZONE
4 to 7

PAUL W. MEYER



U l m u s c r a s s i f o l i a
CEDAR ELM

OUTSTANDING FEATURES:

An excellent native elm for arid conditions, this tree grows to 50 to 70 feet tall with a spread of 40 to 60 feet. The small leaves exhibit some fall color.



RUHM SOFFER

CULTURE:

Plant in sun. Will withstand drought and heavy, infertile soil. Can be susceptible to Dutch elm disease and elm leaf beetles.

HARDINESS ZONE
7 to 9

HABIT AND USE:

A fine-textured tree. Used as a street and shade tree in the Southwest.

NATIVE HABITAT:
Mississippi to Arkansas
and Texas

U l m u s p a r v i f o l i a
LACEBARK ELM

OUTSTANDING FEATURES:

A highly adaptable ornamental tree. The small, lustrous, dark green leaves turn yellow to reddish in fall. At maturity this elm reaches 40 to 70 feet tall with a spread of 40 feet. The growth rate is moderate to fast. The winter bark is a stunning mottled gray, brown, cream and orange.

HABIT AND USE:

This strong-wooded elm is round headed at maturity. Use in a winter garden, on a patio, in urban areas or as a street tree. It is often called the Chinese elm, however the true Chinese elm is the inferior *Ulmus pumila*.



ROBERT M. HAYS

CULTURE:

Grows in sun and shade. Adaptable to extreme soil and pH and tolerant of pollution and soil compaction. Resistant to Dutch elm disease and elm leaf and Japanese beetle.

VARIETIES AND RELATED SPECIES:

'Emerald Vase' — A large (70 feet) tree with upright spreading branches resembling the American elm.

NATIVE HABITAT:
North and central China,
Korea and Japan

HARDINESS ZONE
5 to 9

Zelkova serrata

JAPANESE ZELKOVA

OUTSTANDING FEATURES

A handsome, graceful, vigorous shade tree. At maturity the Japanese zelkova reaches 50 to 80 feet with an equal spread. The smooth gray bark becomes mottled with creams, grays and oranges. Fall color ranges from yellow to orange, brown, red and red-purple.

HABIT AND USE:

This broadly vase-shaped plant has been used as a substitute for the disease-ravaged American elm. Excellent in urban situations as a street tree, it also makes a nice specimen and shade tree.

CULTURE:

Thrives in sun in deep, moist soils but tolerates a range of pHs, pollution, wind, drought and soil compaction. Resistant to Dutch elm disease.

VARIETIES AND RELATED SPECIES:

'Green Vase' — Vase-shaped, upright arching branches. More graceful than 'Village Green'.

'Village Green' — Rapid growth, superior fall color and cold hardiness.

NATIVE HABITAT:
Japan

HARDINESS ZONE
5 to 8

ROBERT W. HAYS



R E C O M M E N D E D

Trees

B Y R E G I O N

Lack of space prevents us from running an exhaustive list of recommended trees by region.

The following is a list of ten choice trees for nine major regions of the country.

N O R T H E A S T



TIM BOLAND

Nyssa sylvatica



TIM BOLAND

Cladrastis lutea

Acer griseum
Paperbark maple

Betula nigra
River birch

Cladrastis kentukea (C. lutea)
Yellowwood

Cotinus obovatus
American smoketree

Koelreuteria paniculata
Goldenrain tree

Nyssa sylvatica
Black tupelo

Quercus rubra
Red oak

Sorbus alnifolia
Korean mountain ash

Stewartia pseudocamellia
Japanese stewartia

Syringa reticulata
Japanese tree lilac

M I D - A T L A N T I C

Acer palmatum

Japanese maple

Magnolia x soulangiana

Saucer magnolia

Betula nigra

River birch

Malus hupehensis

Tea crabapple

Cornus florida

Flowering dogwood

Prunus x yedoensis

Yoshino cherry

Corylus colurna

Turkish hazel

Quercus phellos

Willow oak

Crataegus viridis

'Winter King'

Green hawthorn

Sophora japonica

Japanese pagodatree

LARRY ALBEE



Crataegus viridis

TIM BOLAND



Magnolia x soulangiana

S O U T H E A S T

Acer rubrum

Red maple

Pistacia chinensis

Chinese pistachio

Betula nigra

River birch

Quercus phellos

Willow oak

Koelreuteria bipinnata

Goldenrain tree

Quercus virginiana

Live oak

Magnolia grandiflora

Southern magnolia

Ulmus parviflora

Chinese elm

Malus 'Callaway'

Flowering crabapple

Zelkova serrata

Japanese zelkova

JUDITH D. ZUP



Magnolia grandiflora

PAUL W. MEYER



Quercus virginiana

M I D W E S T



ROBERT M. NAYS

Betula nigra



BOB HYLAND

Syringa reticulata

Acer rubrum

Red maple

Acer saccharum

Sugar maple

Betula nigra

River birch

Carpinus caroliniana

American hornbeam

Fraxinus pennsylvanica

Green ash

Malus 'Donald Wyman'

Flowering crabapple

Quercus macrocarpa

Bur oak

Quercus rubra

Red oak

Syringa reticulata

Japanese tree lilac

Tilia cordata

Littleleaf linden

C E N T R A L P L A I N S



BOB HYLAND

Cercis canadensis



TIM BOLAND

Ginkgo biloba

Acer rubrum

Red maple

Celtis occidentalis

Common hackberry

Cercis canadensis

Redbud

Ginkgo biloba

Maidenhair tree

Gymnocladus dioica

Kentucky coffeetree

Populus deltoides

Eastern cottonwood

Quercus rubra

Red oak

Sophora japonica

Japanese pagodatree

Syringa reticulata

Japanese tree lilac

Tilia x euchlora

Crimean linden

ROCKY MOUNTAINS

Acer ginnala

Amur maple

Koelreuteria paniculata

Goldenrain tree

Celtis occidentalis

Common hackberry

Populus deltoides

Eastern cottonwood

Crataegus viridis

'Winter King'

Green hawthorn

Quercus macrocarpa

Bur oak

Elaeagnus angustifolia

Russian olive

Quercus rubra

Red oak

Gleditsia triacanthos var.
inermis

Honeylocust

Tilia cordata

Littleleaf linden

JERRY PAVIA



Elaeagnus angustifolia

TIM BELAND



Koelreuteria paniculata

DESERT SOUTHWEST & TEXAS

Cercidium floridum

Palo verde

Quercus virginiana

Live oak

Cercis reniformis

Redbud

Prosopis glandulosa

Honey mesquite

Chilopsis linearis

Desert willow

Sophora secundiflora

Mescal bean

Pistacia chinensis

Chinese pistachio

Ulmus crassifolia

Cedar elm

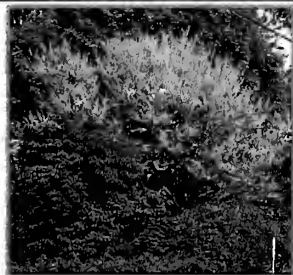
Quercus shumardii

Shumard oak

Ulmus parviflora

Chinese elm

BOB WILAND



Cercis canadensis

PAUL W. MEYER



Ulmus parviflora

PACIFIC NORTHWEST



BOB HILLAND

Acacia baileyana



ALLEN HOWARD

Chionanthus retusus

Acacia baileyana
Cootamundra wattle

Aesculus x carnea
Red horse chestnut

Chionanthus retusus
White fringetree

Eucalyptus ficifolia
Red-flowering gum

Ginkgo biloba
Maidenhair tree

Koelreuteria bipinnata
Goldenrain tree

Magnolia grandiflora
Southern magnolia

Malus floribunda
Japanese flowering crabapple

Pistacia chinensis
Chinese pistachio

Quercus agrifolia
Coast live oak

SOUTH FLORIDA & SOUTHERN CALIFORNIA



ALLEN HOWARD

Chorisia speciosa



ALLEN HOWARD

Cinnamomum camphora

Acacia baileyana
Cootamundra wattle

Callistemon citrinus
Lemon bottlebrush

Chorisia speciosa
Floss-silk tree

Cinnamomum camphora
Camphor tree

Eucalyptus ficifolia
Red-flowering gum

Jacaranda mimosifolia
Jacaranda

Liquidambar styraciflua
American sweetgum

Magnolia grandiflora
Southern magnolia

Quercus agrifolia
Coast live oak

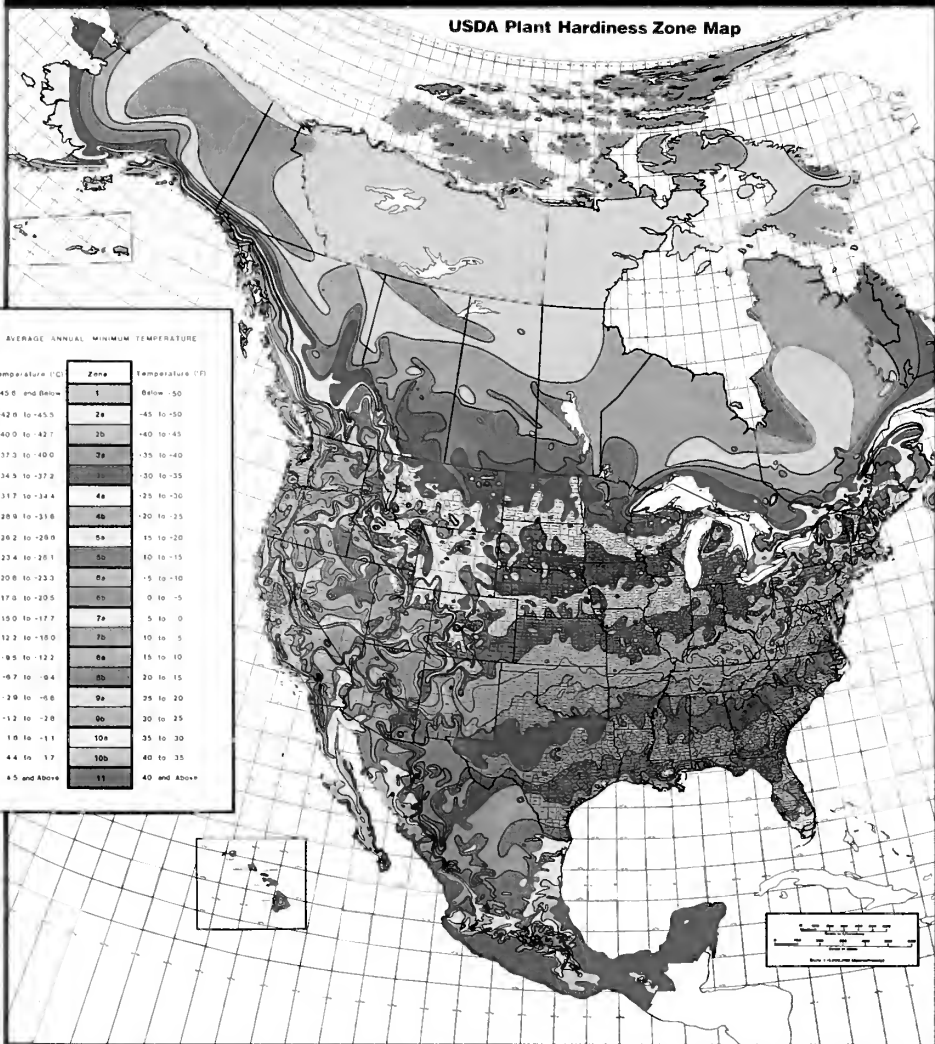
Tabebuia chrysotricha
Golden trumpet tree

H A R D I N E S S Z O N E

Map

AGRICULTURAL RESEARCH SERVICE, USDA

USDA Plant Hardiness Zone Map



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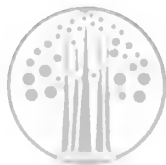
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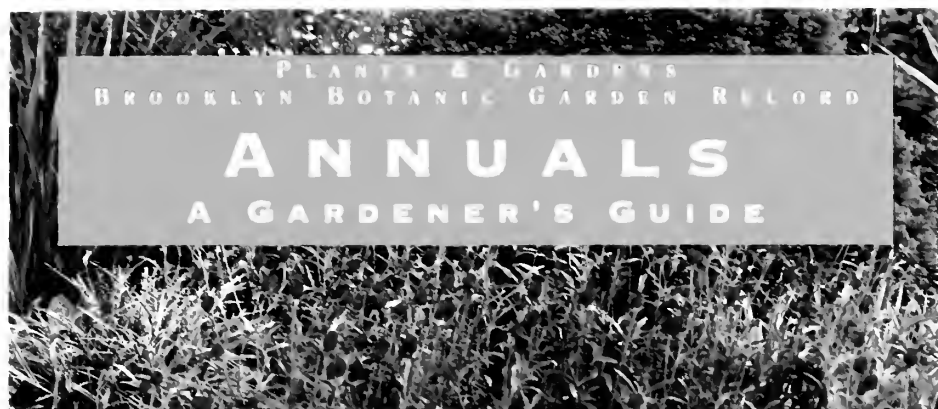
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Illustrations by Jill Buck



Stock, *Matthiola incana*, adds a stately presence to the garden, scents the air, attracts butterflies and is a good cut flower.

FOREWORD

The resurgence of interest in annuals may have something to do with fashion. They go in and out of fashion every generation or so. Annuals enjoyed their heyday during the Victorian era, when the new bedding plants had a virtual monopoly in the most fashionable, formal gardens.

The reawakened interest may also be attributed to the popularity of the cottage garden style. Lush, overstuffed and slightly madcap, cottage gardens have inspired garden tastemakers ever since the waning of the Victorian bedding craze, when gardens took on a less structured, more naturalistic look. Many gardeners have taken an interest in the old-fashioned flowers they remember from their grandparents' gardens.

ROB PROCTOR is the author of the *Antique Flower series*: *Perennials* (HarperCollins, 1990), *Annuals* (1991), and *Country Flowers* (1991) as well as the forthcoming *The Potted Bulb: Volumes I and II* (Simon and Schuster, 1993.) He teaches, paints and gardens in Denver, Colorado.

Perhaps we value annuals again because of their beauty and grace and the form of their flowers and foliage. Many annuals have a stately presence and flower freely, recommending them for a place in beds and borders in sun and shade. They climb and trail, decorate patios and porches and sit on the breakfast table as cut flowers. They scent the air, spice up the salad and screen the compost pile.

Wherever gardeners live, annuals play an important role. Some thrive in a sultry summer, others bloom in northern latitudes and mountainous regions. Some are so adaptable that they find a home in gardens throughout the continent.

Besides their beauty, dependability and ease of culture, annuals — in their amazing diversity — present a gardener with a multitude of options each year. Some are a passing fancy, while others earn a permanent place in the border and in the heart. Perhaps annuals have come back into fashion for good.

ROB PROCTOR
Guest Editor



THE VICTORIAN LEGACY

BY MARY FORSELL

Amaranthus caudatus

The Victorian era was an exuberant, even dizzying time. It gave us the telegraph, the double-decker bus, the skyscraper and endless other inventions; introduced a pastiche of pastimes, from Bingo to badminton; and gave rise to such diverse institutions as the beauty contest and the Daughters of the

American Revolution. But of greatest interest to gardeners is the development of the greenhouse and the subsequent obsession with carpet bedding. Often breathtaking, sometimes garish but always inventive, carpet bedding is one of the most eccentric and fascinating styles in garden history.

The events that would eventually lead to the carpet bedding craze, which relied heavily on annuals for its effects, began in the 1820s and gained momentum on into the 30s. Prominent English garden writer John Claudius Loudon was leading an impassioned crusade against the estab-

MARY FORSELL is the author of *Heirloom Herbs* (Villard, 1991) and *Berries* (Bantam, 1989). The *Herbal Grove* will be published by Villard in winter 1994. She gardens in Spring Lake, New Jersey.

Left: Dusty miller, *Senecio cineraria*, was popular in Victorian carpet beds. Here it is interwoven with marigolds.

lished English landscape garden (a style, incidentally, that had been developed to counter the extreme formalism of European gardens). Loudon criticized the idea of creating a garden that merely copied nature's grandeur, believing that it was deceptive to the viewer. It was much more honest, and tasteful, felt Loudon, to create a garden filled with exotic plants — species that couldn't possibly have grown naturally in the landscape — and arrange them in such a manner as to show distinctly the human hand at work.

Loudon's philosophy was well timed. The Victorian era was a period of intense plant exploration. European and North American plant hunters visited jungles, rain forests and other remote locations in the southern hemisphere in search of species whose novel shapes and colors might win them a place in gardens back home. Horticulturists experimented with hybridization on an unprecedented scale. The new, improved greenhouse, made pos-

sible by technological advances of the Industrial Revolution, was fully exploited to house this influx of exotic foreigners.

In the first half of the century, English estate gardeners created the bedding system, a technique for displaying exotics in seasonally changing vignettes designed to bedazzle onlookers, much like modern-day department store windows. The plants were sometimes of one type planted *en masse* by the thousands; other times, several different kinds were contrasted.

These garden design currents swiftly took hold among the genteel of America, and soon colorful beds became standard on their pleasure grounds. With the election of Andrew Jackson to the presidency in 1828, began the reign of the common man. "Old Hickory," as Jackson was known, encouraged greater participation of the general populace in government, imparting a sense of entitlement to the middle class. Like the wealthy land barons, the middle classes adopted the practice of exotic bed-



LAUREN SPRINGER

In their bedding schemes, the Victorians often planted one type of annual *en masse*. Zinnias were favorites, especially the low-growing forms.



In flowerbeds along the walkway to the house, Victorians strove to proclaim that they were people of style and taste. Here, pink ivy geraniums and spider flowers combine handsomely with plants grown for their gray foliage.

ding to proclaim that they were people of taste and substance. Of course, this required a greenhouse, which made this garden structure a coveted feature of the middle-class home.

The nineteenth century in general was a period of intense style consciousness, and as the decades progressed, this fervor only grew. International exhibitions were especially important in disseminating fashion and stimulating an appetite for the exotic. The Crystal Palace, the ultimate greenhouse, was designed by Joseph Paxton and erected in London in 1851 to host the exhibition titled "The Industry of All Nations." International exhibitions followed in quick succession, including the 1876 Centennial Celebration in Philadelphia.

The era also saw the rise of many architectural revival styles. In America, wealthy industry barons constructed grand estates in the French Renaissance chateau and Italian Villa styles. Undaunted, the burgeoning middle class created its own home castles in the Queen Anne and Greek Revival modes, among others. Not known for their minimalism, such homes were filled with imported porcelain, exotic carpets and cabinets bursting with curios, sculpture, beadwork and oversize floral arrangements. Mass production allowed everyone — not just the very rich — to bedeck their homes with all manner of machine-made furniture and frippery. Home decorating magazines sprang up to advise people on how to design their



Phlox drummondii, dwarf phlox, was often combined with other low, clipped annuals to form "knots" reminiscent of the parterre designs of previous eras.

homes, and never had so many exotic choices been available. As Russell Lynes wrote in his book *The Taste-Makers*, it was at mid-century that E. B. Bigelow invented a power loom "to make Brussels and tapestry carpets, which were eventually to cover the floors of America with flora and fauna in colors that sang at the tops of their lungs."

A popular home decorating publication of the day, *Appleton's Journal*, reported in its 1887 "Editor's Table" that "color and . . . splendor" were decidedly back in vogue and declared that the "delight in form, and light and shadow, and pomp, has come back to us — with many modifications, of course, but with much of its old sense of beauty for beauty's sake."

How aptly these words can be applied to concurrent movements in gardening. By the late Victorian period (which began around 1870), head gardeners of the British gentry, still the leaders in horticultural exploits, attempted to outdo one another in intricate arrangements of plants. Instead of merely displaying mass groupings of exotics on their lawns, these gardeners began to create intricate and challenging patterns that relied on strong color contrasts.

America caught wind of this horticultural development, and carpet bedding (as the technique came to be known) became the rage everywhere. It was the quintessential example of "beauty for beauty's sake" and the perfect complement to the exuberant

architecture and interior design of the day. Carpet bedding involved using primarily low-growing flowers and foliage plants to create fantastically intricate patterns. So that not a detail could go by unnoticed, such beds were often angled slightly. Gardens were also positioned to be admired from second-story porches or bay windows. Although perennials were also used in carpet-bedding schemes, annuals were of special appeal to the Victorians as by their nature they provided continuous and profuse bloom and allowed for greater experimentation. Some designs were simple spirals or wavy bands of annuals, often in violent juxtapositions of color, consisting of scarlet sage (*Salvia splendens*), flaming yellow or red Flora's paintbrush (*Emilia coccinea*, then known as *Cacalia*), crimson pheasant's eye (*Adonis annua*), blue cornflower (*Centaurea cyanus*), yellow dwarf zinnia (*Zinnia elegans*), insistently orange African daisy (*Arctotis breviscapa*) and eye-catching pink rose of heaven (*Lychnis coeli-rosa*). Concentric rings of different flowers, building progressively in height, might be punctuated at the center with a tall, focal point such as love-lies-bleeding (*Amaranthus caudatus*), prickly poppy (*Argemone grandiflora*), spider flower (*Cleome hassleriana*) or the towering castor-oil plant (*Ricinus communis*), cultivated for its foliage, either growing out of the ground or from a decorative urn.

There were also carpet beds reminiscent of parterre designs of previous eras, with "knots" of low, clipped, interwoven annuals. Dusty miller (*Senecio cineraria*), floss flower (*Ageratum houstonianum*), dwarf annual phlox (*Phlox drummondii*), dwarf Mexican marigold (*Tagetes tenuifolia* var. *erinus*), stonecrop (*Sedum caeruleum*) and rose moss (*Portulaca grandiflora*) were suitable choices for such beds.

On the more stylized end, carpet bedders applied their art to create all manner

of figures: birds, crosses, coats of arms, shields, letters, trefoils, human forms, urns, stars, fish — anything that could be "drawn" with flowers and foliage. Popular foliage plants for these categories were coleus (*Coleus x blumei*), with crimson and green frilled leaves, and fancy-leaved geranium (*Pelargonium* spp.), with beautiful foliage rippled with gold, ivory, scarlet and green. Complementing the foliage were profusely flowering candytuft (annual *Iberis* species), China pink (*Dianthus chinensis*), pot marigold (*Calendula officinalis*), forget-me-not (annual *Myosotis* species), baby blue eyes (*Nemophila menziesii*) and mignonette (*Reseda odorata*).

Today, echoes of this lavish style can usually be found only in public places: flower beds spelling out a town's name on a grassy knoll, theme parks intermingling freakish topiary with whirling displays of lollipop-colored annuals. By and large, most home gardeners opt for more subdued (some would say "bland") approaches. How exciting it must have been to live in an era that encouraged such outlandish gardening escapades! Carpet bedding was a pure expression of Victorian *joie de vivre*, a sentiment that spilled over into everything they did. Witness a bulletin entitled "Annual Flowers," by G. N. Lauman and L. H. Bailey, published by the Cornell University Agriculture Experiment Station in January 1899. The authors describe 459 annuals in lists with characteristic Victorian enthusiasm: "These lists emphasize the riches which are now at the disposal of every home-maker, and which the enterprising seedsmen have brought from the ends of the earth." The Victorians were well aware of both the old stock of classic annuals and the horticultural gems newly available to them. Like jewelers, they combined and displayed these gems in the most spectacular settings possible.





ANNUALS FOR THE MIXED BORDER

BY LAUREN SPRINGER

Alcea rosea

Too often, annuals are grown apart from the rest of the garden in segregated beds, instead of being allowed to mingle and socialize with perennials and shrubs. The most popular cultivars are bred for ever more outlandish flower size and color, making it all the more difficult to integrate them effectively with the more subtle plants that make up a garden.

LAUREN SPRINGER, *who gardens in northern Colorado, writes a weekly gardening column for The Denver Post.*

Left: Annuals mingle with perennials in a lush, colorful flower border.

Fortunately, a number of old-fashioned and less familiar annuals can still be called upon to do double duty in the mixed border, lengthening the floral display, filling gaps, adding fragrance, color, form and texture. Unlike their overbred, gaudy cousins, these plants don't overpower their neighbors; they enhance them. They have retained their original grace: some semblance of balance between leaf, stem and flower remains. Many are fragrant; many thrive in less-than-optimal soil and water conditions. Best of all, a number of them self-sow, a delightful quality that relieves the gardener of yearly seeding and adds a degree of spontaneity to a planting that is impossible to replicate.

Some dependable self sowers are large enough that they require that you reserve space for them: bulky-leaved borage (*Borago officinalis*) with starry blue flowers that enhance both pastels and the warmer reds, yellows and oranges, for example, or bronze fennel (*Foeniculum vulgare* 'Pur-

pureum'), a three- to four-foot tender perennial with feathery, anise-scented foliage. 'Italian White' sunflower, quite dwarf compared to its coarser relative, must still be allowed a good four by four feet if its distinctive, chocolate-eyed pale yellow flower heads are not to be cramped. *Hibiscus trionum*, with the same beautiful flower color, needs a bit less room. Each creamy blossom stays open only a few hours a day, but so many are produced as long as the weather remains warm that you don't notice these fleeting comings and goings. It goes by the pretty name "flower of the hour." Old-fashioned *Cosmos bipinnatus* can rival a shrub in girth when its ferny foliage has reached midsummer proportions. The newer cultivar 'Sonata' grows to a more manageable two feet, but I have yet to see whether its progeny retain this smaller stature.

The self-sowing annuals more easily allowed to run rampant in the garden are those smaller, narrower ones with sparse



LAUREN SPRINGER

Many old-fashioned annuals can lengthen the floral display and add fragrance, color, form and texture to a perennial border.

foliage that slip in and out of other plants without usurping precious space. A rose garden is much improved by allowing sweet alyssum (*Lobularia maritima*) to carpet the base of the shrubs. The white, soft lavender and rose colors complement the tones of old garden roses. For the brighter orange, scarlet and yellow hybrid teas and floribundas, sky-blue annuals love-in-a-mist (*Nigella damascena*) or Chinese forget-me-not (*Cynoglossum amabile*) make an effective foil. Tall spikes of larkspur (*Consolida ambigua*), the lazy gardener's delphinium, contrast with the rounded form of the rose blossoms. A haze of purple *Verbena bonariensis* (*V. patagonica*) among late-season flushes of pink, white and butter-yellow floribundas brings the rose season to a lovely close.

In drier, less fertile soil, hot pink annual catchfly (*Silene armeria*) mixes with pastels or, for the more daring colorist, with gold- and orange-flowered perennials and annuals. Drought-tolerant annuals in sunshine colors such as tulip poppy (*Hunnemannia fumariifolia*), California poppy (*Eschscholzia californica*), tiny Dahlberg daisy (*Dyssodia tenuiloba*) and blazing star (*Mentzelia lindleyi*) are all fine-textured enough to mix in a fiesta-colored jamboree with the catchfly without becoming garish. If you can't stomach such a color combination, try pristine white prickly poppy (*Argemone platyceras*) with lovely, silver-veined bluish foliage, and jewels-of-Opar, (*Talinum crassifolium*) with airy sprays of rose flowers and peach-colored seeds. The ruby-red, diaphanous flowers of annual flax (*Linum grandiflorum* 'Rubrum') are gorgeous combined with deep, true-blue *Delphinium chinensis*, an easy annual that also self-sows prolifically. And for mauve, lavender and powder-pink tones, opium poppies (*Papaver somniferum*) with their tissue-paper petals and the newer 'Fairy Wings' or 'Mother of Pearl' poppies are ideal.



LAUREN SPRINGER

Tall spikes of larkspur (*Consolida ambigua*) can substitute for delphinium in the border.

Old-fashioned annuals are once again chic, thanks to the renewed interest in heirloom plants and cottage gardening. It is wonderful to be able to find seed of plants that for decades had only been available from generous gardeners willing to pass seeds and seedlings over the fence. For those of us surrounded by a sea of suburban lawns, the satiny flowers of *Clarkia amoena*, the fragrant, tiered, rose-pink blossoms of lemon balm (*Monarda citriodora*), flaxlike, fuchsia-colored corn-cockle (*Agrostemma githago*) and similar *Lychnis coeli-rosa* and the daintily veined pink petals of *Malva sylvestris* were coveted but rarely obtainable. Now it is much easier to find seed or transplants, and these graceful flowers can be tucked among the perennials of summer or in the spaces left by tulips and daffodils.

A group of annuals indispensable for the perennial border, especially the young one in which plants have not yet matured

and there is too much soil to be seen, are the annual weavers. These petite plants sprawl and trail, threading themselves between the more substantial members of a border. Campanulalike white and purple cup flower (*Nierembergia hippomanica*), the blue- and pink-flowered viper's bugloss (*Echium lycopsis*), lavender and white thread-leaf verbena (*Glandularia tenuisecta*, syn. *Verbena tenuisecta*) and the shrimp-pink jester-cap flowered *Diascia* spp. all do well in infertile soil with little water. Two delicate daisies are also well-suited to these conditions: Swan River daisy (*Brachycome iberidifolia*), in shades of lavender, purple and white, and Mexican fleabane (*Erigeron karvinskianus*), pink in bud and white in flower. There is even a toned-down version of the garish marigold ideal for weaving — the 'Little Gem' series, including 'Lemon Gem' and 'Tangerine Gem', with tiny single flowers borne for months on end.

Quite the opposite of the weavers are

the showier annuals whose flowers rival the newest hybrid petunia or zinnia in size and color but whose more graceful growth habits enable them to blend easily into existing plantings. Shrublike *Lavatera trimestris*, with huge pink and white mal-low blossoms and attractive maplelike foliage, can rival any perennial in the border. Pale pink hawksbeard (*Crepis rubra*), the deep crimson, ball-shaped plumed thistle (*Cirsium japonicum*) or the brilliant yellow, orange or red pendulous tassel flower (*Emilia coccinea*) all jazz up a planting without becoming overbearing. Gentian blue *Salvia patens* is the perfect companion to fiery tassel flower. Many salvias and their close relatives the agastaches, annual in cold climates, have showy, brilliantly colored flowers yet retain a sinewy form that the stubby, more common annuals lack.

Tall pink *Dahlia merckii*, perennial in warmer climates, has none of the girth and need for staking that the large "dinner plate" hybrids have. Yet it is stately and imposing



LAUREN SPRINGER

Marigolds, salvia, dahlias and ornamental peppers comprise the hot-colored flower walk at Langwood Gardens.

towards the back of the border with pink and white *Cleome hassleriana*. Annual black-eyed Susan (*Rudbeckia hirta*) is another lovely and dependable old stand-by.

Foliage is not usually an annual's strong suit, but several tender perennials and biennials can add this element to a mixed border. Giant cardoon (*Cynara cardunculus*), a tender perennial closely related to the artichoke, has pewter foliage that is striking with both hot and cool colors, as are the equally large yet whiter leaves of biennial Scottish thistle (*Onopordum acanthium*). Both these members of the thistle family send up flowers their second year in the garden, but the foliage is what makes them worth growing. Smaller *Cirsium spinosissimum* is better where space is at a premium: the viciously spiny foliage is gray-green edged and marbled with white. In flower, the plant loses all its charm, so it should be grown as an annual for its first-year foliage rosette. Woolly white mullein leaves (*Verbascum bombyciferum*) remain a low rosette the first year, sending up a tall, attractive yellow-flowered spike the second year; this drastic change in stature makes them a bit hard to place in the garden. Horned poppy (*Glaucium* spp.) grows scalloped blue-gray leaves which it tops with honey-colored flowers its second year. All these biennials can grow in meager soil with little water but require full sun. For the most striking, richly hued, glossy maroon foliage, try *Dahlia* 'Bishop of Llandaff', with scarlet flowers that are set off perfectly by the foliage. It adds a smoldering, deep tone, but use it only in a well-watered and fed border.

Finally, several biennials can provide the much-needed vertical element to the often overly rounded, "lumpy-lump" border. Old-fashioned foxgloves (*Digitalis purpurea*) lend a fairytale quality to a partly shaded area. Poison hemlock (*Conium maculatum*) is lovely in leaf and flower, but should not be



Lobularia maritima, sweet alyssum, and vibrant red cockscomb, *Celosia cristata*.

used where there are children or animals. Its ferny foliage and lacy white flower umbels are taller than most gardeners and can soften the back of a border or a planting of shrubs. Queen Anne's lace, a close but edible relative, is more manageable at two to three feet. In full sun, the vibrancy of fiery orange-red standing cypress (*Ipomopsis rubra*) and the quaint charm of hollyhocks (*Alcea rosea*) are hard to match. On the shorter side, opalescent clary sage (*Salvia sclarea*), with great hairy gray-green leaves and a crisp, pungent fragrance, blends into just about any perennial border.

Annuals have long been pariahs among the horticultural tastemakers, and not without reason, as those most commonly seen are so limited in use. Aside from beds and containers, they have little place in the garden. The key is to look beyond those dozen or so plants at the wondrous assortment of annuals that complement the more permanent members of the garden.



DISCOVERING NATIVE ANNUALS

BY STEVEN FOSTER



Eschscholzia californica

Columbus left the Canary Islands in his three famous ships on September 5, 1492, making landfall a few weeks later. Few events in human history have had such a dramatic impact on

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the world, especially the plant world. Columbus's arrival ushered in a new era in plant distribution — worldwide, transoceanic distribution of plants through human intervention.

Writing about native annuals 500 years later, one is tempted to broaden the definition of "natives" to include Latin America. After all, South America has given us some of our best annuals: the brilliant trumpets of marvel of Peru (*Mirabilis jalapa*), the sweet-scented ornamental jasmine tobacco (*Nicotiana glauca*) and the common nasturtium (*Tropaeolum majus*). As tempting as it is to include South American annual natives, we will narrow the definition of "native."

Left: *Euphorbia marginata*, snow-on-the-mountain, a native of the Great Plains.

"Annuals" and "natives" have both become catchwords that require some definition. In some quarters annuals have become associated with the gardening klutz, the person who wants effortless results — instant color, instant satisfaction, something you can buy in six packs with blooms already in place. Annuals do lend themselves to horticultural mass marketing; the positive side of this is that they bring gardening to the non-gardener. Growing annuals from seed requires a little more effort, but still involves little more than putting the seeds in the ground and adding appropriate doses of water. Annuals are also excellent subjects for the horticultural experimenter. Beyond the plants available at the local nursery, or even the local supermarket, annuals offer endless possibilities for exploration and discovery.

The term "annuals" is more easily defined than the term "natives." Strictly speaking, to define a native plant, one must first establish the natural geographic boundaries of the species. Biologically speaking, if you grow a plant in its natural range, it is native. Outside those boundaries it is non-native. But it's not quite as simple as that. To use an analogy, although my ancestors were European transplants naturalized to the North American continent, I am a native of North America or, more precisely, a native of Maine. But in my chosen home of Arkansas, I will always be an alien. Is a California poppy still a native plant when grown in Maine? Not biologically speaking, but if you want to call it an "American native," then you are safe. What constitutes a native plant is relative to the area delineated in the conversation.

An annual technically is defined as a plant that completes its life cycle, from germination to maturity to death, in one growing season. Sometimes a plant is an "annual" by circumstance, such as the climate in which it is grown. Although perennial in its



Collinsia heterophylla, innocence, native to the western states.

native haunts, a plant may be annual when grown elsewhere. I grew sweet marjoram (*Origanum majorana*) in Maine for several years, believing it was an annual. Then I moved to California and was surprised to learn that the plant is a perennial. The same is true of the California poppy (*Eschscholzia californica*), California's state flower. In California or other parts of the country where the temperature does not dip below 0° F, it behaves as a short-lived perennial. But for most of North America, the California poppy is an annual. You could call it native to Arizona, Nevada, New Mexico, Oregon, Washington, Texas and, of course, California, but it is as alien to Maine as I am to Arkansas. Nevertheless, it has gained the attention of gardeners



Phacelia campanularia, California bluebells, also a western native, produces a delicate explosion of blue in the garden when planted *en masse*.

throughout the country as one of the most appreciated "native annuals." The feathery, dissected, blue-tinted leaves are like lace decorating the lustrous, bold, orange-gold, four-petaled blooms, which unfold in their brilliant splendor on sunny days, closing at night or under cloud cover.

E. californica is a highly variable species, which has at one time or another spawned over 100 descriptions and names. Now, however, it is recognized as a single, highly variable taxon. This variability produced varieties sporting gold-bronze, yellow, orange, orange-red, cream-white and rose-pink flowers. The delicate blooms, sometimes double, are up to three inches across. The plant grows from six to 18 inches in height.

The genus *Eschscholzia* was named for J.F. Eschscholtz (1793-1831), an Estonian explorer, biologist and physician. Once consisting of as many as 123 species, the genus is now recognized as possessing eight to ten species native to western North America. Specimens reached Europe as early as the 1790's and quickly became popular. The plant is now naturalized in at least a dozen countries of western and central Europe.

The plant is easy to grow, thriving in poor, sandy soil in full sun. If the soil is too rich, it will produce an abundance of vegetative growth with fewer blooms. Plant seeds about one-eighth inch deep after danger of frost has passed in spring. They germinate in about two weeks. Plant it

directly in the garden, because California poppy does not transplant well.

The California poppy makes a good annual for the herb garden, adding color and the opportunity to appreciate its historical lore. The Costanoan Indians of central California placed one or two flower petals under a child's bed to induce sleep. A flower decoction was rubbed in the hair to kill lice. Indians of Mendocino County used an extract or wash of the fresh roots to allay toothache. The root's stupefying effects were said to have been utilized by native Americans who were gambling, presumably to dull the competition. The plant was chemically investigated as early as 1844. Nineteenth-century physicians found that an alcohol extract at a prescribed dose produced calm sleep while quieting pain.

While the California poppy is the best native annual that the state has contributed to horticulture, there are others. Take *Phacelia*, or California bluebells, a genus of about 150 species of the water-leaf family (Hydrophyllaceae), also native to a number of other western states, Mexico and the Andes. *P. campanularia* is bell-like in appearance as the species name implies. In *The English Flower Garden*, William Robinson called it "the best kind [of plant], free in its fine dark-blue flowers spotted with white in the throat; they last a long while, and the plant makes a pretty carpet in sunny places"; which brings me to their use — mass planting. Although an individual *Phacelia* is less than riveting, planted *en masse* they produce a delicate explosion of blue in the garden.

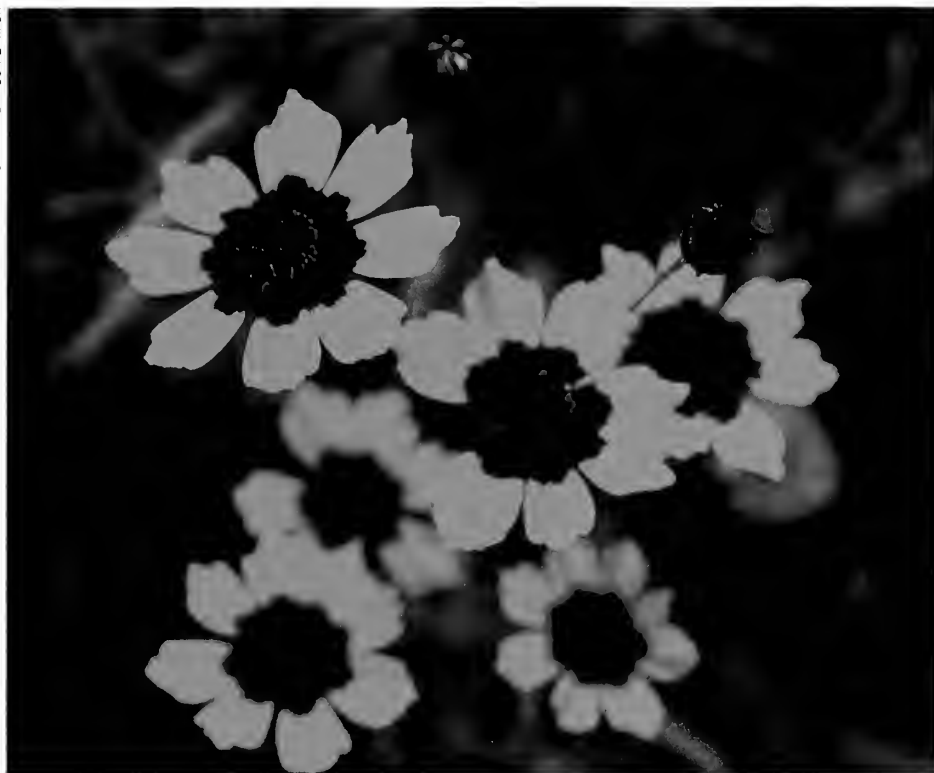
Adapted to sandy, well-drained, poor soils, they thrive in full sun. Plant seeds in a cool spring soil after the last frost, tamping them lightly into the surface. Flowers bloom from mid-spring to mid-summer, depending upon the region. Other popular species include *P. tanacetifolia*, which grows from one to three feet tall and has

leaves resembling those of tansy (*Tanacetum*). *Phacelias* reached Europe, and hence horticulture, in the 1830's. *Phacelia* also makes a good addition to the herb garden for color and historical value. The roots were used by various Indian groups of the western United States as a treatment for coughs and colds as well as stomach problems.

Collinsia, a genus in the figwort family (Scrophulariaceae) with about twenty species primarily from the western states, was introduced into English horticulture soon after its discovery by the Scottish botanist David Douglas (1798-1834). Named for Zaccheus Collins, botanist and former vice president of the Academy of Natural Sciences of Philadelphia, *collinsias* are popularly known as Chinese houses because the tiered whorls of flowers have a pagodalike appearance. Ranging from white, rose and lilac to bright blue, these plants deserve greater appreciation.

The most widely grown species, also called innocence, *C. heterophylla* (*C. bicolor*), has blue-lavender flowers with white markings. It grows from one to two feet tall, preferring a relatively moist, well-drained, rich soil and light shade. Given enough moisture, it will tolerate full sun. Sow seeds in late autumn or early spring, scratching them into the soil to a depth of about one-eighth inch. For the open-minded herb gardener, this is another opportunity to add color and historical appreciation. *C. parviflora* was used by the Navaho to make a horse run fast. The Natchez used the root of the eastern North American native *C. violacea* as a remedy for colds, coughs, consumption and whooping cough.

California and the Southwest in general have given us more annuals than any other region of the country. The arid regions of the West explode in color in the spring as dozens of annual species go through their entire life cycles, from the sprouting of



Native to the Great Plains and surrounding regions, *Coreopsis tinctoria*, plains coreopsis, blooms freely in almost any garden soil.

seed to seed dispersal, in six weeks or less. It is only for a short period that the conditions are right for lush growth in America's dry regions. Eastward-ranging species also provide interesting — though fewer — native annuals for the flower garden.

Native to the Great Plains and adjacent regions, plains coreopsis, plains tickseed or calliopsis (*Coreopsis tinctoria*) has been a popular addition to seed mixes in recent years. It has escaped from cultivation and irregularly established itself in the Southeast. Sporting seven to eight yellow-orange, triangular ray flowers, usually reddish brown at the base, this glabrous annual is a familiar sight along roadsides of the prairies, blooming from June through August.

The plant is sometimes traded as "Calliopsis," which is an obsolete generic name once applied to showy annuals separated from the genus *Coreopsis*. Calliopsis is derived from the Greek *kallistos* (beautiful) and *opsis* (eye), referring to the attractive, reddish-centered blooms. *C. tinctoria* was once known as *Calliopsis elegans* in the garden trade. Coreopsis comes from the Greek *koris* (bug) and *opsis* (translated to mean "resemblance" in this case), referring to the buglike appearance of the fruits. The ticklike seeds also give rise to the common name tickseed.

C. tinctoria is a hardy, showy annual that can be raised with little care, blooming freely in almost any garden soil. In its native haunts it seems to prefer seasonally

damp, disturbed sites such as sandy ditches or low sandy ground. Growing to about three feet in height, it is best planted in the middle or back of a seasonal border. Sow seeds in early spring, covering them with about one-quarter inch of soil. It is an excellent annual for cut flowers or naturalizing in semiwild areas.

Few native annuals are grown more for their foliage than their flower, but this is the case with snow-on-the-mountain (*Euphorbia marginata*). Actually, the leaflike bracts extending beyond the flowers are the showy part of this plant. Often cultivated, it has frequently escaped and become more common in its native Great Plains since human settlement. This member of the spurge family grows from one to three feet in height. Usually unbranched, the broken stems exude milky latex, typical of spurge family members.

The bracts, sometimes entirely white or variegated, are most prominent in June

through October. Native from Minnesota to Texas and Montana to New Mexico, it prefers limy prairies, roadsides, pastures and wastelands. In the garden it is easy to grow from seed, which can be sown in spring or fall at a depth of about one-eighth to one-fourth inch. Given a sunny location, it doesn't seem to be too particular about soils. The plant is not suitable for cut flower arrangements because the milky latex can be highly caustic and can cause dermatitis. It has even been used to brand cattle.

These are a few native American annuals that have found their way into horticulture. Some, like the California poppy, had only to be seen once to be introduced into the trade. Others, such as *Collinsia*, needed a champion — someone like David Douglas — to promote them. Many more native annuals await discovery by gardeners. Columbus, after all, didn't really "discover" America, he was simply the first to promote its development.



Phacelia tanacetifolia, which grows from one to three feet tall, is honey-scented and a favorite of bees.

IN SEARCH OF ANTIQUE ANNUALS

BY MARILYN BARLOW

Ipomoea alba

Flowers — they are made solely to gladden the heart of man, for a light to his eyes, for a living inspiration of grace to his spirit, for a perpetual admiration." So elegant and florid, the quote comes from the Victorian era seed catalogue of Comstock, Ferre & Co.

Many of the flowers that captured the hearts and souls of gardeners back then are still in favor today, morning glories, bachelor buttons and nasturtiums among them.

Seed merchant MARILYN BARLOW specializes in antique and heirloom varieties. Her mail order company, *Select Seeds*, is based in Union, Connecticut.

Others have quietly disappeared from gardens and are rarely found in seed catalogues; flowers with nostalgic names such as 'Painted Lady' sweet pea (*Lathyrus odoratus*), double carnation-flowered poppy (*Papaver somniferum*), azure-blue single 'Emperor William' cornflower (*Centaurea cyanus*) and sweetly-scented white marvel of Peru (*Mirabilis longiflora*). Still others, endangered or perhaps lost, may survive only in print in the lists and descriptions of seed catalogs of the past.

Within the aged covers of these catalogs one finds a celebration of diversity. The Burpee's *Farm Annual* of 1903 lists over 600 annual flower varieties suitable for the garden, including 87 sweet peas.





At left: *Lathyrus odoratus*, sweet pea, found in many an old catalog, is still a favorite today. Above: The cypress vine, *Ipomoea quamoclit*, has feathery foliage and starlike flowers.

Eighty-nine years later, seeds of fewer than 200 annual flowers are offered by the same company, and the emphasis has changed from species to hybrid series.

The simple flower mignonette (*Reseda odorata*) was deemed worthy of eleven separate listings in Burpee's 1903 issue; 'Machet' (available today), 'New Golden Machet,' 'Improved Golden Queen,' 'Allan's Defiance,' 'Erfurt,' 'Quaker City,' 'Giant Flowered Red,' 'Parson's White Tree,' 'Giant Pyramidal,' 'Improved Sweet' and 'Giant White Spiral'. To that list Park's 1904 *Floral Guide* added two more, 'Goliath' and 'Victoria'. One satisfied customer was prompted to write, "Mr. Park, Oh, the delightful fragrance and the modest beauty that lay dormant in a packet of your large-flowered Sweet Mignonette seeds!"

In tantalizing prose, period catalogs sing the praises of one annual flower after another: the moonflower's "rich Jessamine-like odor" (*Ipomoea alba*), the cypress

vine's "elegant feathery foliage" and "scarlet flowers which stand out like constellations of stars" (*I. quamoclit*). No wonder we're unable to resist their admonition, "Let everyone possess themselves of it."

Unfortunately, most antique annuals have disappeared from commerce. A few names are familiar. 'Queen of the Market' China aster (*Callistephus chinensis*) and 'Empress of India' nasturtium (*Tropaeolum*), listed in Burpee's 1903 catalog as well as earlier editions, are still available. So are 'Crimson Giant' mignonette, listed in Buist's 1889 catalog, and the red and silver-white striped 'America' sweet pea (*Lathyrus odoratus*), listed in Prior's 1904 catalog. All appear in current listings of European seed houses.

Others, such as the striped globe amaranth (*Gomphrena globosa*), the bush dolichos, a non-twining hyacinth bean featured in Burpee's 1904 catalog (*Dolichos lablab*), the white-flowered cypress vine,





At left: Some antique varieties of *Gomphrena globosa*, globe amaranth, have disappeared from commerce. Above: *Callistephus chinensis*, China aster, is still available.

available as recently as 1989, and a marvel of Peru (*Mirabilis jalapa*) with "light green marbled leaves" are elusive and perhaps lost.

It's not only the venerable old-timers that fashion is passing by. The powder blue 'Blue Star' morning glory (*Ipomoea tricolor*) developed by Denholm Seeds in 1949 today is offered by only two or three seed merchants. 'Flying Saucers' morning glory, also a relative newcomer, can no longer be found. Antique as well as newer varieties continue to drop out of seed production and, therefore, seed catalogs at an alarming rate.

Once an antique annual is rediscovered, period catalogs provide the means to authenticate it. Trialing (growing the variety and comparing it with as many written descriptions and illustrations as possible) is also necessary. If all goes well, these varieties end up in my seed stocks and catalog and/or those of other heirloom seed merchants around the world, ready to flourish once again.

Searching for antique annuals is not the exclusive province of heirloom seed merchants, however. Heirloom seed exchanges, horticultural organizations' seed sales and agricultural market bulletins are additional sources which enable everyone to be a force for preservation. Seed merchants and gardeners can join forces to preserve our floral heritage. We can protect antique annuals from the vagaries of large commercial seed houses by enlisting experienced gardeners around the country to become contract growers of these endangered varieties, supplying small seed merchants who, in turn, supply the growing numbers of gardeners enamored of these precious plants.

For a complete list of flower seed exchanges, contact the American Horticultural Society's Gardener's Information Service, 1-800-777-7931, and ask for their bulletin "Heirloom Seed Resources."



ANNUALS FOR COOL CLIMATES

BY DAVID TARRANT



Nigella damascena

Brightly colored annuals are always associated with those hot days of high summer. In the southwest corner of British Columbia where I live, we rarely get the dog days of sum-

mer so common in other areas of North America. And, contrary to popular opinion, it doesn't always rain here. We do get our fair share of moisture — something like 60 inches per year in Vancouver — but most of it falls during the fall and winter months, leaving July, August and September a good growing season for annuals.

We're not the only ones without sultry summers. Gardeners at high elevations and in northern latitudes also need annuals that perform in cool weather.

We have a good climate for many of the so-called hardy or half-hardy annuals — such plants as California poppies, Shirley

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Left: *Papaver rhoeas*, the Shirley poppy.



Nigella damascena, love-in-a-mist, is usually blue. This one, called 'Cranberry', has dark pink flowers.

poppies, snapdragons and calendulas — which can easily be seeded directly in the garden. In fact, snapdragons and calendulas often self-seed.

Those familiar with reseeding annuals know the type — the ones that come up where they like. This gives them the reputation of being weedy, but my English roots tell me that they are the plants that produce the true cottage garden effect. You can always pull out the ones that “volunteer” in the wrong places.

If these plants are to be sown in a mixed border, prepare the ground at the end of the previous summer by adding a little well-rotted compost and turning it in. Trust me, if you wait until spring to enrich the soil the results will be poor. Don't overprepare; soil can be too well cultivated for most of the directly sown annuals. The

time to direct sow is early in the season when the days are warm enough for the annual weeds to start germinating and the nights are still cool. In the Pacific Northwest this is late April.

Pot marigold (*Calendula officinalis*) forms a nice bushy plant two feet in height, with rich green foliage. The rayed flowers, up to four inches across, range from pale yellow to brilliant orange. The petals are edible and do much to brighten up a salad. The plants thrive in poor soil and full sun. There have been many new cultivars in recent years. The 'Bon Bon' mix offers flowers ranging from bright yellow and orange to delicate apricot and soft yellow.

Centaurea cyanus, commonly called bachelor buttons, is a slender annual reaching about two feet with narrow



Felicia amelloides, blue marguerite, which comes from South Africa, grows one to two feet high.

leaves and the most gorgeous blue flowers, although the inch-wide blossoms are sometimes purple, white or pink. They are superb cut flowers. Bachelor buttons must be grown in full sun in well-drained soil. Sown among solid orange calendulas, the dark blue cultivar 'Jubilee Gem' is stunning.

Consolida ambigua is the old favorite known to many of us as larkspur or annual delphinium. Delicate, feathery foliage covers the lower third of the branches below a spike of bright blue, pink or white flowers. It's a great one for cutting and also a good candidate for drying as it keeps its color well.

Cosmos bipinnatus is a rangy annual good for planting among other tall flowers towards the back of a mixed border. The flowers are true daisies in white and pink to

dark magenta. They cut well, and when seed is set later in the season they are a great attraction for birds.

Native to California, baby blue eyes (*Nemophila menziesii*) prefers semi-shade. It grows up to a foot in height with pinnate leaves and sky-blue flowers. I have had good success with it in patio containers. Some of the best plantings I have seen were in Skagway, Alaska.

By now you will know that I am addicted to blue flowers. The flowers of *Nigella damascena* are predominantly blue. The foliage is fennel-like, clothing the stem and surrounding the flowers like a mist, hence the common name love-in-a-mist. In recent years I have fallen for one with dark pink flowers called 'Cranberry', and there is a good white form as well.

Shirley poppy (*Papaver rhoeas*) is a



Tropaeolum peregrinum, canary creeper, is a smaller cousin of nasturtium with handsome leaves and showy yellow flowers.

must for cooler climates. Not only does it thrive here, but it does well on the Atlantic coast and in mountainous regions. Some of the best plantings I have seen were on the Gaspé in Quebec and in New Brunswick. They are typical poppies with nodding buds. The petals have a tissue-paper quality. The flowers are up to three inches across and range from white through pink to dark rose. In recent years there have been strains introduced, such as 'Fairy Wings', with delicate, muted colors.

The glaucous foliage of opium poppy (*Papaver somniferum*) forms a pretty rosette at the base of the plant, and leaves appear all the way up the three-foot stems. The flowers are large, sometimes double and a bit blowsy. I prefer the singles which can be delicate mauve, pure white and many shades of red.

Reseda odorata is commonly called mignonette but sadly is not commonly grown. It is not a showy annual but it is highly fragrant. The plant is short — no more than ten inches tall — and falls about a bit. The foliage is somewhat like small spinach and the flower spikes are greenish yellow and brown. It must be sown near patio doors or windows for sheer summer evening sensuous delight.

Nasturtium (*Tropaeolum majus*) is a terrific annual for cooler climes. There are now bushy forms but the typical habit is trailing. The leaves are attractive, like flat circular umbrellas, and the flowers are three inches across and spurred at the back. They come in a wide range of colors and are sweetly scented.

Canary creeper (*Tropaeolum pere-*



Nicotiana glauca, flowering tobacco, is usually white and a bit rangy in growth habit. 'Nikki' is a newer, more compact form with pink to red flowers.

grinum) is a smaller cousin of the nasturtium. Its yellow flowers are only one inch across but many and showy, set off by handsome lobed leaves. It climbs over other plants well, and if used on a trellis it will provide quick summer privacy.

Tender Perennials

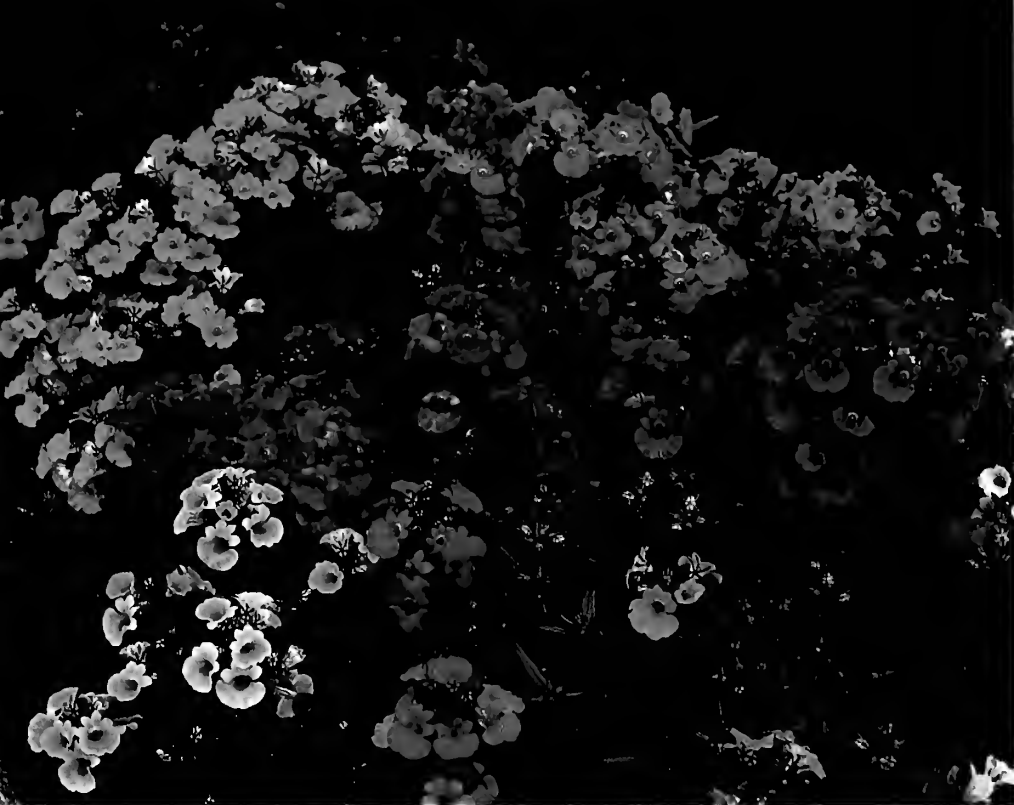
Many of the direct-sown annuals are not season-long performers. A variety of tender perennials can help prolong the summer display. For these annuals, which are started indoors or purchased and planted out for the summer, good soil preparation is a definite must. Add either well rotted manure or compost to the area in late fall or early spring.

Fibrous begonia (*Begonia semperflorens*) comes into its own during August, blooming until frost. It forms a bushy plant with

shiny, waxlike leaves and masses of tiny flowers. There are many horticultural forms, some with dark red foliage and others with light green. These plants do best in a semishaded spot, although they grow well in full sun with adequate moisture. Fibrous begonias root well from cuttings and may even be wintered inside as houseplants.

Callistephus chinensis, better known as China aster, reminds me of my childhood as they were a popular plant in southern England. They are easy to grow, extremely showy and invaluable for cutting. The overall height is 18 inches to two feet. They are basically single-stemmed daisies three to four inches across, several per plant, in a range of colors. I prefer the single types.

Blue marguerite (*Felicia amelloides*) comes from South Africa and is anywhere from one to two feet in height, bushy, with



Nemesia strumosa, a showy annual at its best in early summer, is a good container plant.

rough, hairy leaves. The blue daisy flowers have bright yellow centers and measure half an inch across. There are white-flowered forms and one with striking variegated leaves is worth looking for. Propagate from cuttings and overwinter in a cool greenhouse.

Impatiens walleriana, sometimes called busy lizzie, is valuable because it comes into its best from August through September. Even in our cooler climate it requires shade. Most garden cultivars reach anywhere from six inches to two feet. The plants are bushy with succulent stems and small leaves. The flowers are one to two inches across in white, red, pink and deeper shades of rose. Some of the more recent introductions are in designer shades of purple and hot pink. They overwinter well from cuttings.

Rose mallow (*Lavatera trimestris*) is a wonderful annual mallow that attains three feet in height with angled leaves about two inches across and many large rose-pink flowers three inches across. It is a must for any mixed border. A gorgeous white form is called 'Mont Blanc'. I have seen superb beds of this plant in Alaska and Nova Scotia.

Nemesia strumosa is a very showy annual known widely by its botanical name. It is one of those early-summer showstoppers that is usually past its best by mid-August. It forms erect but bushy plants a foot to 18 inches in height. Masses of bright flowers, one inch across, cluster at the top of each stem above narrow leaves. *Nemesia* is a good annual for pots.

Flowering tobacco (*Nicotiana glauca*) has large basal leaves like those of fox-



Nolana paradoxa is a spreading plant that does well at the front of the border or in pots.

glove and long rangy stems to three feet carrying the sweetly scented, trumpetlike blossoms. The flowers are two inches long and about one and a half inches across. A dandy cultivar for flower arranging, 'Nikki Lime' has chartreuse flowers. Recent introductions, such as the 'Nikki', 'Domino' and 'Starship' strains, are shorter and more manageable for smaller home gardens. They should be in every mixed flower border in cooler climates.

Nolana paradoxa is another one of my blue favorites. I was first introduced to it in a Nova Scotia garden, where I was impressed by its bright, dark blue flowers with a whitish to pale yellow throat. *Nolana* is a spreading plant up to 18 inches in height, and it grows well in containers and is invaluable for the front of a border.

Osteospermum amplexans is another South African native that thrives in this climate, but its showy daisies only open on sunny days. The plant reaches about 18 inches and tends to fall about, forming attractive loose clumps. The flowers are two inches across and range from creamy white through yellow to apricot, with shiny black centers. It is a spectacular annual and deserves to be grown more widely.

Tagetes filifolia is one of the many marigolds known to gardeners. This particular one is my favorite because it forms a small compact bush up to a foot in height with fine foliage and many tiny, half inch, bright orange or yellow flowers. It was the old standby edging marigold and is still as valuable as ever. One thing in particular in this marigold's favor for Northwest gardens is its tolerance of rain.



ANNUAL STYLE IN THE WARM-WEATHER GARDEN

BY TOM PEACE

Z e a m a y s

The midsummer garden is a wonderful canvas on which to paint your passions and personality, just as clothes, cuisine and decor display individual style for others to enjoy. Not many gardeners see this sometimes difficult season as an opportunity to express themselves. Perhaps it is because too many see petunias, pansies and marigolds as the only options for summer color; and to

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make matters worse, these plants rarely survive the entire season, often passing out from the heat and spider mites.

Few gardeners realize just how flexible their "permanent" borders can become by adding annuals. Each summer is a new opportunity to imbue the garden with fresh colors, textures and themes. Bulbs and early-blooming perennials such as delphinium, poppy, iris and lupine, which have played out by June, can share space in the border with annuals for the summer. With an expanded palette of heat-tolerant annual flowers and foliage, the summer garden

Left: A spectacular combination for the warm-weather garden: *Ricinus communis*, castor bean, *Gladiolus callianthus* and *Monarda*, beebalm.



Cleome hassleriana, spider flower, which grows six to ten feet high, is a good candidate for the back of the border.

becomes an ideal setting in which to express personal style — even in areas with stiflingly hot summers.

Hot weather, for plants, is defined more by night than by day temperatures, and it is important to wait until the weather warms sufficiently before planting out heat-loving flowers. Follow the rule of thumb for peppers in the vegetable garden: wait for 60-degree night temperatures before setting them out. Over-eager spring planting of some heat lovers will stunt the plants and slow their performance for the rest of the season. Impatiens planted after the last frost (but while the weather is still cool) will be only half the size of those planted three weeks later (with warmer night temperatures) when the two are compared in

August. So relax and enjoy the late-spring blooms without feeling the need to plant for summer until the weather is warm. Then let your imagination run wild and transform your garden into a colorful summer paradise.

Hot-weather annuals include three different plant types: tender perennials (such as *Verbena bonariensis* or *Salvia farinacea*) which are hardy from zone seven south, tropicals (the likes of *Coleus* and *Caladium*) and true annuals (*Portulaca*, *Perilla* or *Ageratum*, for example). There will be some overlap. Some of the tropical or tender perennials may be shrubs or even trees in their native habitats, but in our gardens for the summer they stay much smaller.

While annuals by definition are expendable components of the mixed border, you may want to make an effort to hold over a few favorite tropicals or tender perennials (if they won't survive under a heavy mulch). Once I got hold of my princess flower (*Tibouchina urvilleana*), I always found a spot inside the house for it to spend the winter, and it also became the mother of many new plants from cuttings. *Hymenocallis*, caladiums, cannas, summer callas and tuberous begonias all can be stored easily for the winter, so a one-time expenditure produces an excellent yield of summer pleasure over the years.

Easy annuals can be regenerated yearly from seed, so do be sure to collect some seed for yourself and your friends. The adventurous gardener may have to hunt around a bit for the less familiar catalogs featuring unusual annuals, but the extra effort is worth it.

After a long, cold winter with scanty horticultural relief, I tend to overcompen-

sate in the summer months. Sometimes it is all I can do to keep from planting the parlor palm out where the poppies and delphiniums have finished their spring show. I do, however, always manage to find a place for castor beans (*Ricinus communis*), cannas and corn (that's right, *Zea mays* — more on this in a minute).

Of these three, cannas require the least room in the border and fit right in where the June bloomers have retreated. The canna's unfortunate history of misuse has led many gardeners to view this flower with disdain, but I find its foliage and form to be a refreshing ingredient in the border, especially when combined with some of the larger ornamental grasses like *Miscanthus* or *Pennisetum*. Statuesque red-leaved castor beans provide the backbone for such a combination; in roomier gardens, the six to ten foot plants also look stunning amidst woodland tobacco (*Nicotiana sylvestris*) with its large chartreuse leaves, and pink or white spider flower



LAUREN SPRINGER

Large ornamental grasses such as *Miscanthus sinensis* 'Variegatus', left, and *Pennisetum setaceum*, right, also make statuesque backdrops for the border.



Castor bean is a dramatic accent against a terra cotta-colored wall.
Give this plant plenty of room.

(*Cleome hassleriana*). Add a few dozen fragrant, white-flowered Abyssinian gladiolus (*Gladiolus callianthus*) and 'Italian White' sunflowers for a cool-looking, dramatic planting.

Corn was the first grass I fell in love with, long before big ornamental grasses were in vogue. I am still impressed by its ability to grow so tall so quickly, but successful use in the border depends on planting tight clumps rather than rows as in ear production. If you like autumn-colored foliage, try the Indian corn which turns rich burgundy-red as it ripens, contrasting with the late blue blooms of *Salvia guaranitica* or S. 'Indigo Spires' and golden *Rudbeckia triloba* in the foreground. Otherwise, choose the tallest variety of corn that you can find, such as 'Silver Queen', which rises to eight or nine feet in just a few hot months and is reminiscent of timber bamboo.

Moving out of the land of the giants to mid-sized plants, I recommend tall verbena (*V. bonariensis*). This plant is a nonstop performer but needs to be planted in small groups, at least, for the airy, three- to five-foot stems to carry their weight in the garden. Tall verbena's purple heads contrast perfectly with yellow, orange or red cannas and by Hawaiian hibiscus (*Hibiscus rosa-sinensis*).

Dahlias finally fit in with the rest of the summer garden, no longer needing to be segregated in another bed due to the outlandish scale of their frisbee-sized flowers. The relatively new class of border dahlias offers a wide range of bloom colors. The pastel varieties of these sun worshipers from Mexico look at home in cottage gardens with daylilies and baby's breath, and their brighter counterparts can add pizzazz to sassier combinations.

Salvias are the wave of the future for hot-weather gardens. Although most salvias are perennial in Zone 7 and south, some are easily used as annuals for summer color farther north. The average gardener knows only scarlet *S. splendens* and blue *S. farinacea*. The sub-shrub cherry sage (*S. greggii*) is now available in creamy white, coral, pink and purple in addition to its original red-flowered form. Cherry sage tolerates heat and drought. I plant it in drier soils with yellow creeping zinnia (*Sanvitalia procumbens*) and moss rose (*Portulaca* hybrids); it harmonizes well with pale yellow *Coreopsis* 'Moonbeam' and blue *Ageratum* 'Cut Wonder' in soils with more moisture. Another Zone 8 perennial used as an annual, scarlet sage (*S. coccinea*) produces orange-red flowers on terminal, three to four foot spikes from midsummer until frost. It tolerates some shade, so don't be afraid to try it under trees with woodland tobacco and *Rudbeckia triloba*, punctuated by red-leaved caladiums for a stunning effect.

Heat-loving annual additions to the border aren't all hot colored, so there is hope for those who abhor reds and oranges. Both the blue plumbago (*Plumbago auriculata*) and Mexican heather (*Cuphea hyssopifolia*) are Zone 8 perennials that can be used as annuals in the north with wonderful results. Few flowers compare with plumbago's sky blue, phloxlike clusters on the end of arching stems, and the plant blooms easily in the sun at an early age. Mexican heather already will be showing its small violet flowers by the time it's available at local garden centers, and will continue to bloom all summer until the first hard frost. With pink fountain grass (*Pennisetum alopecuroides*) or the white form of Madagascar periwinkle (*Catharanthus roseus*) these plants comprise a well-balanced triad that thrives on heat — even in a ferocious Texan summer — while look-

ing cool and refreshing. Like the periwinkle, globe amaranth (*Gomphrena globosa*) from India is undaunted by oppressive heat and humidity and comes in a cool spectrum of pastel pink, white, peach and violet clover-flowered cultivars. These plants mix prettily with lavender weeping lantana (*Lantana montevidensis*) which shares globe amaranth's amazing ability to withstand the heat. Silvery foliage from dusty miller (*Senecio cineraria*) and bright pink geraniums (pelargoniums are overused but do perform well in the heat) complete this cool-toned ensemble for continuous bloom even when the weather bakes.

Many of the more unusual plants tend toward the fiery hues. One particularly dramatic combination uses Mexican sunflower (*Tithonia rotundifolia*), a large, branching annual with furry leaves and brilliant orange daisylike flowers, flanked by standing cypress (*Ipomopsis rubra*) with feathery foliage on tall vertical stems crowned by clusters of scarlet trumpets, and *Nicotiana langsdorfii* with its nodding green bells thrown in for a bit of contrast.

Another orange bloomer from south of the border is the Mexican fire bush (*Hamelia patens*), a tropical tree used as a perennial in the South and as an annual in colder climates. Fire bush demands hot weather and will sulk in temperatures below 85 degrees, but also requires ample moisture for good growth. A daring soul could try fire bush in a hot spot with purple Mexican bush sage (*Salvia leucantha*), which blooms in late summer, purple border dahlias and a carpet of *Gazania rigens*. Or, if your favorite color is orange, plant Mexican sunflower and fire bush and *Canna* 'Wyoming' with cigar plant (*Cuphea ignea*) in the foreground.

Whether you favor cool, pastel colors or warm, fiery tones, make the most of your border with annuals for nonstop summer bloom.



FAVORITE ANNUAL CUT FLOWERS

BY RITA BUCHANAN

Cosmos bipinnatus

Like many people, I rarely have enough time to just sit outdoors and enjoy my garden. I do the chores — water and weed, plant and pull — then hurry off to work or to a meeting, to cook or to shop. Since I can't linger in the garden, I've learned to bring

the garden indoors by growing loads of flowers for cutting. The reward is surprisingly rich. Appreciating the flowers in a vase on my desk is a focused and intimate experience that lasts for hours as I sit there at work. I never sit still for so long outdoors. Who does nowadays?

RITA BUCHANAN grows annuals and herbs in her Connecticut garden, writes for several magazines and edits gardening books for Houghton Mifflin. She was guest editor of BGG's handbook *Dyes from Nature*, published in 1990.

Annuals provide a wonderful assortment of cut flowers, and they're easy and inexpensive to grow. You can start with transplants from local garden centers, but arranging is more fun when you've got a wide selection of flowers. For more variety, grow your own plants from seed. I study

Left: To last as a cut flower, cosmos, *Cosmos bipinnatus*, must be placed in warm water and stored in a cool room overnight.

the catalogs and order everything that looks interesting, then start just a dozen or so plants of each variety or color. (To save the extra seeds for future seasons, I seal the packets with some silica gel desiccant in moisture-tight containers and store them in a cool, dark place.) I start snapdragons, salvias and other small-seeded and slow-growing annuals indoors under fluorescent lights but direct-sow zinnias, cosmos, calendulas and other fast growers.

The plants described in this article are some of my favorites. In addition to form and color, I look for long stems and a vase life of at least several days in plain water; adding a floral preservative to the water can double the average vase life.

These annuals all grow best in well-tilled, fertile soil with steady moisture and full sun. On average, the plants need a square foot of garden space each. You can combine annuals with other plants in mixed borders and beds, or make a separate cutting garden. A four by 25 foot bed will hold about a hundred plants and provide armloads of bouquets. For easy care and access, I plant flowers for cutting in beds no wider than four feet.

Spring Posies

Pansies, pinks and globe candytuft are some of the first annuals to bloom in spring. They're all small plants and the flowers are rather short-stemmed, but they make charming, long-lived nosegays.

Pansies (*Viola x wittrockiana*) are very cold-hardy but don't take heat well. Gardeners in mild climates can plant pansies in the fall for winter and spring bloom. In colder regions, plant pansies at daffodil time. Cultivars differ in flower color, and the flowers may be solid or have contrasting spots. Dark red and purple pansies are often fragrant. Pansy flower size and stem length are variable. As young plants, 'Swiss Giants' or other large-flowered cultivars

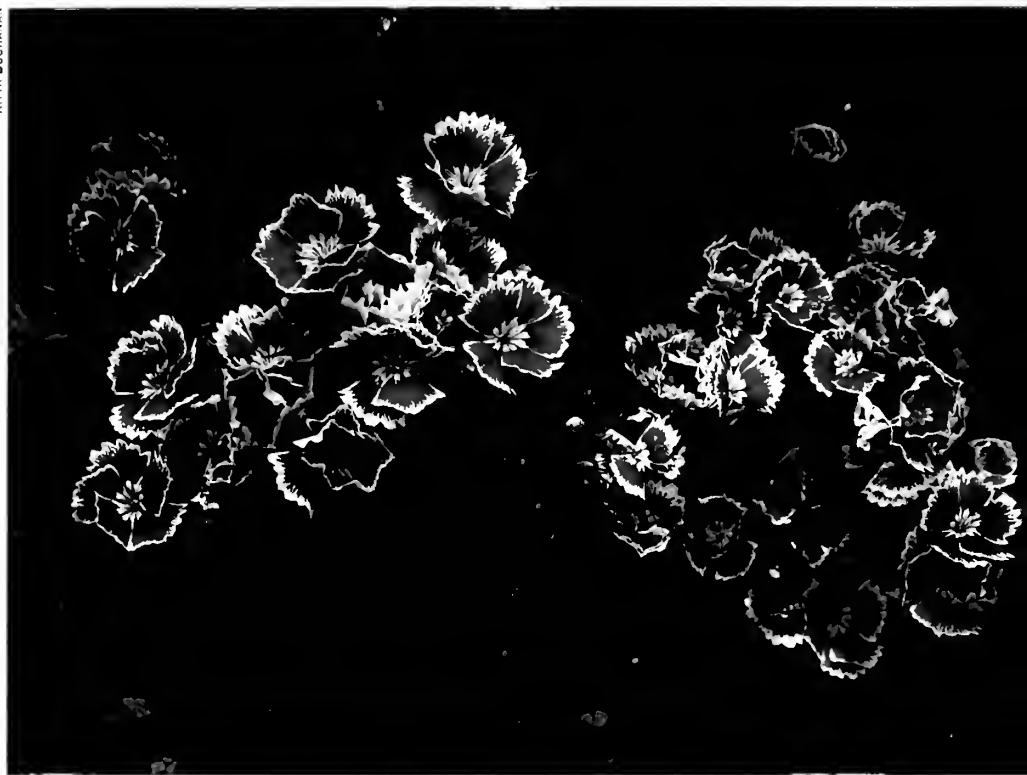


Pansies look lovely floating in a shallow dish.

start bearing flowers up to four inches wide, on stems as short as four inches. These look lovely floating in a shallow dish. Later, the very same plants will make one-inch flowers on eight-inch stems.

The annual China pinks (*Dianthus chinensis*) begin blooming as early as ten weeks from sowing and continue all summer. They bear clusters of dime-sized flowers in bright pinks, reds and white; some have striped, fringed or picotee petals. The 'Telstar' hybrids grow about ten inches tall; they branch at the base, so you can cut entire stems.

Globe candytufts (*Iberis umbellata*) also bloom quickly from seed. The plants form a low mound of a dozen or more stems, each topped with a generous cluster of small white, pink or rosy flowers. The flat



Dianthus chinensis, China pinks, bloom in clusters of dime-sized flowers in shades of pink, red and white. Some are striped, fringed or picotee.

papery fruits (green at first, ripening to a warm gold) develop so quickly that a single stem usually carries all stages from bud to pod. The stems are short, never reaching 12 inches, but both flowers and pods are easy to appreciate.

Fragrant Flowers

Many annuals are mildly scented. The ones mentioned below are especially fragrant (although floral fragrances can be elusive; intensity often varies with temperature and time of day). Within a plant species, different cultivars and color selections may be more or less fragrant. Keep trying until you find a kind you like.

Stocks, sweet williams and carnations all have a warm, spicy fragrance. Among stocks (*Matthiola incana*), I've had better

luck with the ten-week types than with the taller, slower Brompton selections. My ten-week stocks usually bloom in 12 to 16 weeks from seed, with dense upright spikes of tender-petalled flowers in shades of pink, rose, purple and white. Cool temperatures and short days promote the best flowering. In mild climates, the seedlings will overwinter outdoors. Here in Connecticut, I start stocks indoors in late winter and set them out in early spring.

The related night-scented stock (*M. bicornis*) isn't much to look at, with its weak gray stems and sparse lavender flowers that close during the day, but its fragrance is intensely sweet. Tuck one or two stems in an arrangement to fill a room with aroma. Night-scented stocks have an internal clock: even after cutting, they open up

and release their fragrance only at night and close again in the morning.

Old-fashioned sweet Williams (*Dianthus barbatus*) are biennials or short-lived perennials. I sow the seeds in August for bloom the following May and June, and usually start new plants each year. The richly scented flowers are clustered in heads three to five inches wide atop 20-inch stems, and easily last two weeks in water. Individual plants yield a dozen or more stems. There are also annual sweet Williams. They've tended to be dwarf plants with weak stems and scentless flowers, but 'New Era' is a new annual sweet William from Thompson and Morgan, who claim it grows 24 to 30 inches tall with fragrant flowers in May from a February sowing.

Carnations (*Dianthus caryophyllus*) can be tricky. The stems are floppy, the plants are subject to fungal diseases and many cultivars are scentless. But I've been quite pleased with the carnation 'Fragrance', a mix of compact, upright plants with spicy, two-inch flowers in shades of pink or white. From an indoor sowing in March, they bloom from July to hard frost. In water, the flowers last seven to ten days.

Sweet peas (*Lathyrus odoratus*) have penetratingly sweet fragrance. They do best in rich soil, prefer cool weather and generally need a trellis or support. Dig deep and add plenty of compost, then direct-sow the seeds about two inches apart in very early spring. With an early start, the vines grow quickly up to six feet tall and bloom before the heat of summer. (Among sweet peas, "heat tolerant" means the plants tolerate days in the 80's if the nights are cool.) Most cultivars produce about six flowers per bunch in shades of white, pink and lavender. The old-fashioned kinds with smaller flowers are more fragrant than the newer large-flowered varieties.

Sweet sultan (*Centaurea moschata*) does



RITA BUCHANAN

Sweet William, foreground, easily lasts two weeks in water.

fine in ordinary or even poor soil and tolerates heat and dryness. I sow seeds outdoors after the last frost and thin to six-inch spacing. The plants grow about two feet tall and bear lavender, white or yellow flowers resembling two-inch powderpuffs. Cut the flowers just as they open to enjoy their fresh sweet fragrance for several days indoors.

Sweet scabious or pincushion flowers (*Scabiosa atropurpurea*) are clustered in two-inch heads on long, wiry stems. Like sweet sultan, the plants grow about two feet tall. The flowers are more profuse, are borne over a longer season and last longer in water, but they don't smell quite as sweet. Sweet scabious come in shades of pink, lavender, blue and white.

It's easy to overlook the tiny reddish flowers of mignonette (*Reseda odorata*),



The carnation *Dianthus caryophyllus* 'Fragrance' has spicy, two-inch flowers in shades of pink or white. As cut flowers, they last seven to ten days.

but you can't miss their sweet scent. I've read that French homemakers used to keep a single stem in water to perfume a room through the winter months. Those rooms were probably chilly; at room temperature in my house, cut mignonettes only last a week or two. Mignonettes are leafy plants that wilt or die back in hot, dry weather. They bloom quickly from seed, so I sow them in early spring and again in midsummer for fall fragrance.

Fillers

By fillers, I mean delicate blossoms useful for filling the spaces between larger, showier flowers. One airy filler is bishop's flower (*Ammi majus*), a bushy annual with fernlike leaves and flat-topped clusters of tiny white flowers that look just like the

biennial wild carrot or Queen Anne's lace. Start bishop's flower seeds indoors or sow directly in the garden; do both to extend the period of bloom.

Annual baby's breath (*Gypsophila elegans*) has larger flowers — up to one-half inch wide — than the perennial kind. The stems are delicate and branch repeatedly, making the flowers appear to float in space. 'Covent Garden' has chalky white flowers. 'Rosea' is a pink form. Neither dries well, and the plants tend to bloom themselves out quickly, so you'll need to resow every few weeks for flowers throughout the season.

Annual statice (*Limonium sinuatum*), well known as an everlasting, is also a fine fresh cut flower. I start the seed early indoors and set them out when the soil

gets warm. The leaf rosettes stay remarkably flat for several weeks and often grow wider than dinnerplates before flowering starts. Then each plant produces several flower stalks two to three feet tall. Color ranges widely, from white and yellow to rosy pink, lavender and blue.

Spikes

These annuals bear flowers in slender upright spikes. All start blooming at the bottom and proceed to the top, with individual flowers opening over a period of up to two weeks.

Children love to snap the hinged blossoms of old-fashioned single snapdragons (*Antirrhinum majus*). The newer forms with frilly double flowers are more showy but less playful. Many snapdragons, especially the dark red ones, smell like Kool-Aid. All are excellent cut flowers. The seeds and seedlings are small, so I start them in February and set them out a few weeks before the last frost date. (Transplants can take a bit of frost; mature plants overwinter in mild climates.) Pinching the seedlings promotes branching at the base and multiple flower stalks. Hilling a mound of soil around the base of the plants as they grow keeps the stalks from tipping over. The plants may rest after first blooming in early summer — cut off the old flower stalks and they'll bloom again into the fall.

Larkspurs are often described as annual delphiniums, with dense spikes of flat, double, inch-wide flowers in bright blues, pinks and white. Cultivars of the three common species (*Consolida ambigua*, *C. orientalis* and *C. regalis*) differ in height, branching, spike density and time of first bloom. All do best when direct-sown in fall or early spring. They resent transplanting, even if you're careful not to disturb the roots. Larkspurs are good both as fresh cut flowers and as everlasting; indeed, they often dry in the vase with no special care. The petals



Snapdragons come in many forms and make excellent cut flowers.

hold their color well but shatter easily.

Two popular cultivars of mealy-cup sage (*Salvia farinacea*) form finger-sized spikes of tiny flowers atop strong, slender stems. 'Victoria' has blue flowers; 'White Bedder' is white. Start these in a warm spot indoors and transplant the seedlings after danger of frost. Both grow up to three feet tall and flower steadily for months. Native Texas perennials, they are usually grown as annuals in gardens. Like larkspurs, these salvia flowers last well indoors.

Tricolor sage (*Salvia viridis*, formerly *S. horminum*) is an annual that can be direct-sown in warm soil. It's a straggly plant with scratchy stems, and the actual flowers are insignificant. What matters are the clusters of bright pink, blue, lavender or cream bracts that sail like flags atop two-foot



Leucanthemum x superbum 'Starburst', a short-lived perennial best used as an annual, has cheery white flowers on long, straight stems.

stalks. These hold their color well, and are lovely fresh or dried.

Bells-of-Ireland (*Moluccella laevis*) also has a prickly texture and insignificant flowers, but it makes wonderful thick, dense spikes. Each green bell is the expanded calyx of an otherwise tiny flower. Bells-of-Ireland seeds require a few weeks of cool temperatures and light to germinate, and the seedlings don't transplant well. Sow them outdoors in early spring, cover with a very thin layer of vermiculite, and keep them moist. Once started, the plants grow quickly with no special care and grow two to three feet tall.

Daisies and other Composites

Everyone likes daisies and similar flowers, called composites. Most are very easy to

grow, flower abundantly and offer cheery round flower clusters on long, straight stems.

For classic daisies with yellow disks and white rays, try *Leucanthemum x superbum* 'Snow Lady' and 'Starburst'. Both plants are short-lived perennials liable to rot in wet winters, so I grow them as annuals. They flower in mid-summer from a March sowing indoors. 'Snow Lady' has daisies two to three inches wide and grows one foot tall. 'Starburst' has daisies five to six inches wide and grows up to 30 inches tall. The most common form of the herb feverfew (*Chrysanthemum parthenium*) has branching stems topped with dozens of miniature daisies and blooms off and on from summer through late fall. Other plants also called feverfew (*Matricaria inodora*) have spherical white or yellow flowerheads. All

last very well as cut flowers.

Yarrow (*Achillea millefolium*) is another perennial that blooms in its first year. The 'Summer Pastels' series includes shades of cream, pink, yellow, coral and lilac. From a basal rosette of fernlike foliage, stems two feet tall carry flat clusters of tiny daisylike blossoms. Sow the tiny seeds indoors in February and you'll have plants that bloom from July through late fall. Cut when about half the blossoms on a head have opened for fresh or everlasting bouquets.

'Gloriosa daisies' (garden tetraploids developed from the annual black-eyed Susan, *Rudbeckia hirta*) grow two to three feet tall with flower heads up to six inches wide. Some are yellow with brown eyes, others are rusty red, gold, mahogany or bicolored. Start the seed indoors or sow directly in warm soil. Space 18 inches apart, as the plants get rather large and the foliage is prone to mildew if plants are crowded. Cut or deadhead regularly to prolong blooming from summer to fall.

Zinnias, cosmos, calendulas, china asters and dahlias are all easy-to-grow favorites. All transplant easily from seedlings started indoors, or grow quickly if direct-seeded after frost. In every case, to grow flowers for cutting, shun those superdwarf varieties with flowers wider than the stems are long. Look for standard types that grow at least two feet tall.

Among zinnias, I like the 'Ruffles' series, a cut-and-come-again type of *Zinnia elegans* with three-inch, double flowers in scarlet, pink, yellow and white. 'Persian Carpet' and 'Old Mexico' (both cultivars of *Z. haageana*) have smaller, multicolored flowers. Be sure to strip all the leaves off zinnia stems, as they turn to smelly mush if submerged in a vase.

Cosmos bipinnatus 'Sensation' comes in dark and pale pinks and white, with flowers three to four inches wide on plants three to four feet tall. *Cosmos* 'Sonata' has similar



Larkspur is a good fresh-cut flower or can be dried as an everlasting.

flowers on smaller plants. Although I've often read that cosmos make wonderful cut flowers, mine always seemed to wilt quickly. Then I learned that they must be conditioned — placed in a deep bucket of warm water and stored in a cool room overnight. Given that treatment, they last a good week in arrangements.

Growing dahlias (*Dahlia* hybrids) from seed is less predictable but more economical than buying tubers. The plants grow mounds of foliage in the heat of summer, then bloom profusely during the shorter days and cooler temperatures of late August through fall. Choose tall varieties with cactus, pompon or daisy-type flowers. Seed packets generally include a mix of yellow, pink and red. Plunge cut dahlias up to their necks in hot tap water for 20 to 30



Zinnia elegans 'Ruffles' can be cut time and again and will continue to send up its three-inch, double flowers.

minutes, until the stem turns dark gray-green, to increase their vase life by several days.

China asters (*Callistephus chinensis*) can be easy or impossible to grow, depending on whether or not your garden soil is contaminated with fungal diseases. (Some cultivars are wilt-resistant, but most asters are quite vulnerable to disease.) Given disease-free soil, direct-sown asters bloom from late July to frost in shades of white, pink, lavender and purple. There are daisylike single asters with yellow disks, and double forms that resemble fluffy pompons. All make excellent cut flowers.

Last of the season, and perhaps the best cut flowers of all, are garden chrysanthemums. The plants aren't reliably hardy here where winters are cold and wet, so I

grow three cultivars as annuals. *Chrysanthemum koreanum* 'Fanfare' starts blooming in late summer and continues into fall, with clusters of double flowers two to three inches wide atop long branched stems. *C. indicum* 'Super Jet' grows three feet tall, with stems branching near the top to bear dozens of three-inch, double flowers in solid shades of cream, yellow, gold, pink, rust and red. *C. i.* 'Petit Point' has similar stems, but the two-inch blossoms are single, like daisies, with yellow disks and colored rays. Both bloom late, when the fall foliage is at its peak. Even in Connecticut, mums provide cut flowers until Halloween, and sometime bouquets last indoors until Thanksgiving. At that point it's only a short wait until the seed catalogs arrive with promise of next year's season.



ANNUALS WITH FINE FOLIAGE

BY ANGELA OVERY

Euphorbia marginata

The phrase "foliage annuals" sounds like a contradiction in terms. Most people think of annuals as the bright stars of the garden, the bold-colored flowers that liven up the solid foundation of trees, shrubs and perennials.

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However, foliage annuals are indispensable in today's garden. They serve a number of purposes, from disguising unsightly views to creating a lush tropical paradise on a suburban patio.

The term "annual" here has been broadly used to include genuine annuals (which grow from seed, flower and die in one season), perennials that can be used as annuals in climates in which they are not reliably hardy and tuberous plants that can be wintered over indoors.

Foliage annuals can be used to create temporary screens in a great hurry, as well

Left: The spectacular dark red foliage of castor bean sets off deep pink perennial phlox in this mixed border.

as to embellish arbors and trellises. Scarlet runner bean (*Phaseolus coccineus*) is a good choice; its plentiful foliage offers leafy shade, while its red flowers and delicious pods are a bonus. Hyacinth bean (*Dolichos lablab*), which has bronze-purple blushed leaves, pretty pink flowers and an edible bean, will fulfill the same function.

Two tall annuals grow extremely quickly and thus can be used as dramatic backdrops to a border, as bold accents or to screen eyesores. The first is *Ricinus communis*, the castor bean plant from tropical Africa. Its large seeds are sometimes said to resemble ticks, but everything else about this plant, though oversized, is wel-

come. The castor bean plant reaches the size of a small tree or shrub when grown as an annual, with large, palmately compound leaves. It grows with Jack-and-the-beanstalk-like speed — as high as twenty feet in humid climates, about half as high in arid ones. There are green and handsome bronze varieties, such as 'Zanzibaren-sis'. Another exotic-looking African native is *Hibiscus acetosella* 'Red Shield', which rapidly grows to about five feet high and has dark maroon leaves.

Nothing makes a dense, annual hedge like the fat, roundish burning bush (*Kochia scoparia* var. *trichophylla*). Ideal for planting while waiting for a more stately box or yew hedge to grow, the bright green, four-to-five-foot high burning bush turns purple and finally a "hell fire and brimstone" red in fall. Since you're growing it for only one season, you may as well have fun with it.

You may also be amused by the three annuals sometimes called beefsteak plant, thanks to their raw beef color laced with meatlike veins. The most bizarre is *Acalypha wilkesiana* of the Euphorbia family. It is a tropical plant from the Malay Archipelago, named after Charles Wilkes, an American explorer of the Pacific. The tender plant can be grown in a greenhouse or in flower beds or containers for an unusual effect. The toothed edges of some variegated types have handsome pale margins, and other varieties have interesting scrumpled and puckered leaves — like pieces of brilliantly colored fabric cut with pinking shears and bunched together.

Perilla frutescens is a shrubby annual herb from the Orient, sometimes nicknamed beefsteak, but prettier than the connotation and thus often called Chinese basil. Use perilla to introduce small blocks of a metallic, coppery purple to a bed or pot. It looks lovely with pale blue or pink flowers, and quite sophisticated with gray foliage.



LAUREN SPRINGER

Red-veined calladium and chartreuse coleus are standouts in this container garden.

The third beefsteak plant is *Iresine herb-stii*, a tender perennial also called blood leaf. An old-fashioned house plant with dark red and pink leaves, when moved outdoors it can be a striking addition to the shady summer garden.

Dusty miller (*Senecio cineraria*) is another plant that has been around a long time, and is probably the first plant which comes to mind when foliage annuals are discussed. Its popularity is well deserved. The silvery foliaged charmer is a foil for brightly colored flowering annuals and an obvious choice for mixed plantings in pots. Mine have overwintered in the kitchen window nestled among pink-flowering pelargoniums, and it survives outdoors in some regions. A newer plant, which is also called dusty miller on occasion, is *Artemisia stelleriana*, one of the tender perennial artemisias often grown as annuals. It too has soft, gray foliage.

The delicate tones of silvery gray and turquoise blue of the dusty millers can help calm down the bright tropical foliage of *Amaranthus tricolor*, with aptly named cultivars such as 'Joseph's Coat' and 'Molten Fire'. These many-colored herbs can add drama to any garden situation. Purple heart (*Setcreasea pallida*) is another tropical immigrant with silvery purple leaves. Red orache (*Atriplex hortensis*) is a fast-growing, four- to six-foot tall, red-leaved annual that can be sown directly in the border. The strong-colored foliage can be helpful in beds that do not have sufficient shape or structure.

Foliage annuals need not be brightly colored. Two subtler-toned plants I consider well worth growing are feverfew (*Chrysanthemum parthenium* 'Aureum'), for its mounds of lime green foliage and white button blossoms, and American native snow-on-the-mountain (*Euphorbia marginata*), a vigorous annual grown easily from seed with crisp striped green and

white bracts and leaves.

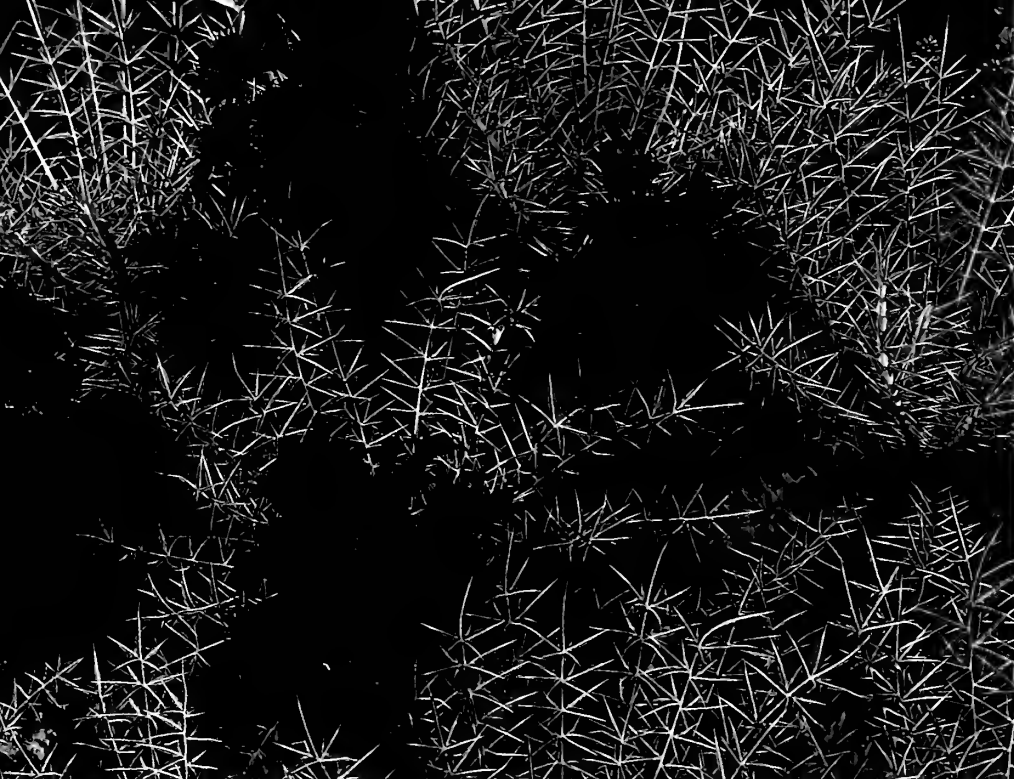
Many of the annual vegetables are finding their way into borders and patio pots, where their foliage, when it is not eaten, adds interesting texture and style. Three of the best are fennel (*Foeniculum vulgare*), which produces airy clouds of green or purple foliage, cabbage (*Brassica oleracea*) and beautiful lettuces, such as *Lactuca sativa* 'Rosy', which has a green iceberg-lettucelike center and delicately frilled mauve outer leaves.

Two thistles are often admired for their wonderful spiky foliage. *Silybum marianum*, milk thistle, displays marbled green leaves and is about three to four feet

LAUREN SPRINGER



Coleus and asparagus add accent, form and texture to this container planting.



In this intriguing foliage combination, *Ptilostemon afer*, a spiny herb, is planted with *Perilla frutescens* 'Purpurea'.

high, while *Onopordum acanthium*, Scottish thistle, a biennial, is an architectural colossus with huge, hairy, silvery leaves. A pair of grasses should be added to any list of fine foliage annuals for the sunny border: *Pennisetum villosum*, feather top, and the larger *Pennisetum setaceum*, fountain grass, add grace and height to summer plantings.

The many brightly colored *Coleus x hybridus* grown in place of blooming annuals are something of a cliché in a shady garden. Planted in blocks of color, or in clever combinations, however, they can be lively. 'Red Velvet', for instance, looks downright theatrical planted with Japanese painted fern and red-leaved fibrous begonias, and there is a good yellow coleus called 'Pineapple Wizard', which gleams beside pale buttery yellow annuals. There

is even a black coleus, which has a good deal of *savoir-faire* planted beside chartreuse feverfew.

If your garden tends toward the fashionable perennials, the place to experiment with some of the intriguing foliage annuals is in pots and baskets, which can be moved about and brought indoors before the first frost. Some of my favorites are the dwarf cannas (*Canna x generalis*) which are really tender perennials and need rich soil and lots of water and fertilizer. Their bright green or burgundy-red leaves are wrapped and folded in neat spikes, like table napkins in a restaurant. They look their best amid frothy annuals which spill out of the pots, like lobelia (*Lobelia erinus*) or sweet alyssum (*Lobularia maritima*). Tall cannas are also excellent at the back of a tropical looking border.



A plethora of annuals with interesting foliage, from multicolored croton to rex begonia to ornamental sweet potato, tumble out of a windowbox.

Elephant ear (*Colocasia esculenta*) has emerald-green, elephantine leaves luxuriant enough to turn a cement or stone patio into a bit of Hawaii, although it needs afternoon shade in most climates and constant moisture. Combine it with pots of *Caladium x hortulanum*, tropical tuberous plants in all sorts of attractive blotched and mottled variations, which enjoy the warmth and shade of a patio or can be bedded out.

Abutilon, so-called flowering maple although it is not related to the tree, is a fast-growing foliage plant that can impart a woodland air to a walled city garden. The plant should be kept in a sheltered spot out of the wind so that its hollyhocklike flowers will not be blown off. Some varieties have interesting speckled leaves. *Abutilon* grows like a shrub, and a potted specimen

is large and unwieldy when brought indoors; to make it easier to manage, train it as a standard (a globe of growth atop a single trunk or stem).

No patio should be without hanging baskets full of foliage and flowering annuals in summer. Pendant tuberous begonias look lovely hanging in humid semi-shade, along with vinca vines, trailing coleus, fragrant-leaved ivy and fancy-leaved geraniums (*Pelargonium* species). Along with their familiar flowers, pelargoniums have the reliably best foliage among the summer plants. The many varieties of pale-margined and blotched leaves in elegant shapes make them favorites for pots and plantings.

Whether you're aiming for a dazzling new display or digging in old friends, foliage annuals are essential



ANNUAL HERBS OF THE FIELD

Find a Home in the Garden

BY CAROLE SAVILLE

Amaranthus gangeticus

A number of useful herbs growing in fields and wayside places are edible ornamental or fragrant and deserve a place in the home garden. In many cases, the *mauvaise herbe* (French for weed) is really a "good" herb. Some have gone so far as to call the edible ones "designer weeds," and savvy specialty produce farmers are marketing these "new" herbs to creative chefs across the

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country. Improved varieties of wild plants, long treasured in many cultures for their unique flavor and nutritional value, are appearing on dinner plates and in garden catalogs.

Wild mustard (*Brassica nigra*), paints the California hills brilliant yellow in spring, contributing to its name, the Golden State. While driving recently atop the hills overlooking Los Angeles on scenic Mulholland Drive, I was asked abruptly by my passenger, a Sicilian chef, to stop the car. Pointing excitedly to the acid-yellow wild mustard abundantly dotting the landscape, he exclaimed, "*Bruscandoli* — how

Left: Nasturtiums add a peppery taste to salads. Both flowers and leaves are edible.

it reminds me of the hills of Sicily!" Later that week while dining at his restaurant, I was amused by the appearance of several new dishes on the menu: bruscandoli served as a vegetable, sauteed simply with garlic and extra virgin olive oil; bruscandoli risotto (his homage to Northern Italy) and pasta bruscandoli, with a sauce of wild mustard and tomatoes.

B. nigra, one of 80 species of the mustard family, Cruciferae, is the most widespread and is the chief source of mustard, made from the plant's plentiful supply of golden spherical seeds. (Like many so-called weeds, it manufactures a tremendous quantity of seed to ensure widespread growth.) Although mustard (*Brassica hirta* var. *alba*) contains considerably fewer seeds, which are white, the plant's young leaves impart a delicious, hot and spicy pick-up to spring salads.

One of the prettiest wild additions to a spring salad is the nasturtium, another peppery-tasting field herb. The beautiful edible blossoms taste similar to the leaves but slightly more delicate; served with a drop of honey, they are a bonus. Red-orange or yellow are the colors normally associated with nasturtiums, but there are many more. Last fall, while visiting the Orcas Islands, I collected seeds from wild nasturtiums with flowers of dark mahogany, yellow streaked with carmine, orange streaked with vanilla and a deep burgundy — which are now growing in my California garden.

Garden nasturtium (*Tropaeolum majus*), also known as Indian cress, an annual native to South America that has been cultivated in Europe since the late seventeenth century, is a somewhat succulent climber or vigorous spreader. Another climber from Andean South America growing in my garden is *T. tuberosum*, with rounded, lobed leaves, grown for its edible tubers. Traditionally, the tubers are frozen after boiling, or are partially dried, to make the taste more

agreeable. This obviously requires some experimentation. This species, grown as a cool-temperature annual, thrives in a sunny location. My favorite cultivated varieties of nasturtium, readily available in garden catalogs, include: creamy, variegated-leaved 'Alaska', with salmon, golden or orange flowers; 'Empress of India', an heirloom with blue-green leaves and rich vermilion-red flowers; and the free-flowering, spurless 'Whirlybird' (all the other nasturtiums have spurs on the blossoms) with its semidouble blooms. These will grow in sun or shade in hot areas. Finally, the trailing 'Gleam' series, with double and semidouble, multicolored, fragrant flowers, is a knockout for summer hanging baskets in full sun.

Another succulentlike plant excellent in the salad bowl is purslane (*Portulaca oleracea*). It is generally considered a weedy troublemaker, and is routinely rooted out of lawns and gardens. Too bad. Its succulent, rounded leaves and stems add texture and tart flavor to a salad, and are a perfect addition to an herbal mesclun. Originally a native of India, it was brought to our shores from Europe, where its wild form has been grown for centuries. Several cultivated forms are readily available in seed catalogs. Golden purslane (*P. oleracea* var. *sativa*), a variety with large golden leaves and orange-gold stems, is stunning in a salad of mixed green and red lettuces. The cultivated green variety is less striking, but has a slightly better taste and is more vigorous than the golden. Purslane is also a pot herb used both in French cookery (known as *pourpier*), and in Mexican cookery, (known as *verdolagas*).

"Star of the Earth" is the way seventeenth century herbalist Nicholas Culpeper described the lovely salad plants *Plantago coronopus* and *P. verticillata*. The basal leaves resemble a green star. Its Italian name, *herba stella*, is much prettier than buck's horn plantain, its English moniker.



Decorative as well as culinary, the vivid blue, cucumber-scented flowers of borage can be sprinkled over salads of creamy Belgian endive or floated in glasses of lemonade, wine or tonic.

Culpeper may have thought it looked like a star, but it most closely resembles deer horns or antlers. This delicious, toothy herb is eaten raw with mixed greens.

Another star herb, *Stellaria media*, meaning "starry plant of intermediate size" and commonly known as chickweed, was named in Medieval times after its white, star-shaped flowers. You will have to share this one with the birds, as it is one of their favorites. You should have no trouble finding it because it grows abundantly throughout the U.S., as well as in Europe and central and Southern Asia. In Japan it is known as *hakobe*, one the seven herbs of spring. It pushes up through the cold earth in January and its leaves are traditionally chopped and added to a thin rice porridge.

My favorite star-flowered herb is borage (*Borago officinalis*) with its vivid-blue flowers, black anthers and foam-green, fuzzy leaves. To show how long this herb has been around, its name may be derived from a Celtic word referring to courage, which is what it will take to eat its hairy leaves as many herbals, old and new, sug-

gest. I use its lovely cucumber-scented flowers in everything I can think of: sprinkled over salads of creamy Belgian endive; in glasses of lemonade, or with tonic and something stronger at the end of the day; floating in white or red wine; or candied like violets to decorate chocolate pastries. Decorative as well as culinary, borage looks beautiful planted on a ledge or in a situation higher than ground level, where its drooping flowers are more noticeable. The herb is native to the Mediterranean region, and it grows wild in the northeastern United States.

The curious herb of fields and woods, claytonia, or miner's lettuce (*Montia perfoliata*), is native to Cuba. Delicate stems with dainty white flowers rise from the center of the tender, fleshy leaves, which are pointed when young and round out as they grow older. It is wonderful eaten raw with other greens and a light vinaigrette, or cooked like spinach.

No spring salad should be without butternut-leaved corn salad (*Valerianella locusta*), which was given the name from its

habit of growing wild among rows of corn. Other names include mache, lamb's lettuce and field salad. Naturalized from Europe, this tender, herbal lettuce was also grown in monastery gardens. One of its cultivated varieties, 'Verte de Cambrai', has petite, teardrop-shaped leaves and a deep green color. Another variety is 'A Grosse Graine', with larger leaves. A very French way to prepare a mache salad includes sliced beets, chopped hard-cooked eggs and walnuts, splashed with a walnut oil vinaigrette. A word of advice: plant mache early, as it can take up to three months to reach full size.

Another "lamb" herb, tasty either raw or cooked like spinach, is lamb's-quarters (*Chenopodium album*). Native to Europe and Asia, it is common throughout the United States. It generally grows from three to five feet, but in certain sections of the country can reach ten feet, so it is best to delegate a separate patch for this plant, a powerhouse of vitamins and minerals. Only the young leaves should be used for salads. Let one plant go to seed and you assure a continuous supply. The seeds can also be dried and cooked like oatmeal or ground and mixed with flour for pastries. A European variety I am trying in my garden this year is the six-foot tall 'Magentaspreen'. When young, its leaves have a true magenta center — yet another beautiful addition to our already colorful salad bowl.

The genus *Chenopodium* has many culinary members. Within the last ten years there has been an ongoing campaign to introduce Americans to quinoa (*C. quinoa*). This excellent cereal grain has more protein than any other grain. Marketed as "mother grain of the Incas" and "super-grain of the future," it is native to the Andes Mountains of South America where it was a staple, along with corn and potatoes, of the Inca civilization. An excellent plant for edible landscapes, quinoa is

drought tolerant and has beautiful autumn foliage. It grows four to six feet tall, with arrow-shaped leaves that can also be boiled as a vegetable. The grains of the seedhead are used as cereal, but before cooking them, you must wash off the natural coating or the grain will be quite bitter.

Three other members of the chenopodium or goosefoot family deserve mention. Epazote (*C. ambrosioides*), indigenous to Mexico and widely naturalized and cultivated in warm countries, is a strongly aromatic culinary herb with a camphorlike scent. As is the case with cilantro, you either love this herb or hate it. It is used primarily in Mexican cookery and lends a pungent flavor to all kinds of beans, corn and tomato dishes as well as pork.

C. botrys, known by the heavenly common name ambrosia, is grown for its arching, feathery plumes up to two feet tall with a spicy-sweet perfume. It is an excellent plant to fashion into dried scented wreaths.

Salicornia europaea grows near the sea or in salt marshes, where it naturally absorbs saline from its environment, making its foliage full of aromatic juice. It is eaten fresh, steamed or pickled. Known as samphire or glasswort, it is a delicious, fleshy, succulent herb with clawlike leaves. (Another common name is chicken-claws, which it certainly resembles.) The derivation of its other name, glasswort, is from the soda contained in its leaves, which once was extracted to make glass.

The many varieties of amaranth were other highly nutritious herbal vegetable plants of the New World. Amaranth was cultivated as a favorite food and the main grain crop of the Aztecs. A staple in Asian cookery, amaranth is also known as Chinese spinach. It is the main ingredient of callaloo, the classic soup of Caribbean cookery, and in India it is known as *bhaji*. As a bonus, its beauty certainly puts it in

the ornamental category. In this country, love-lies-bleeding (*Amaranthus caudatus*), with its long and feathery cerise tassels, has long been planted in ornamental borders. Amaranth's greens contain more iron and calcium than kale, chard or spinach, and its grains are higher in protein than milk and contain lysine, an amino acid absent in wheat, barley and corn. Of the many leafy varieties, a real show-stopper in a salad is Joseph's coat (*A. gangeticus*), with its brilliant red, yellow and green stripes; it can also be cooked as a vegetable.

Mrs. Burns' Famous Lemon Basil (*Ocimum basilicum*) is a fragrant culinary herb which has been reseeding itself for the past 60 years in southwestern New Mexico. Originally grown by the mother of the founder of Native Seed/SEARCH in Tucson, Arizona, the original seed supposedly came from the Canadian Mennonites who were passing through the territory.

Black cumin, black caraway, fennel flower, nutmeg flower and Roman coriander are all names for *Nigella sativa*, which is both an edible and ornamental herb native to Greece, North Africa and north-eastern India. It is also cultivated in France and Germany. Its relative, *N. damascena*, or love-in-a-mist, shows up in the flower section of American seed catalogs. Both are easy to grow. The lacy blue, white or pink flowers of *N. sativa* float atop its feathery green foliage. The seeds that follow the flowers are used to flavor curries or sprinkled over breads and pastries. Both species make exquisite dried flowers.

American pennyroyal (*Hedeoma pulegioides*) is native to our shores and should not be confused with English pennyroyal, a sprawling member of the mint family (*Mentha pulegioides*). Also known as squaw mint, *H. pulegioides*, a drought-tolerant, fragrant herb about one foot in height which resembles a small bush basil with minty



Love-lies-bleeding, *Amaranthus caudatus*, also known as Chinese spinach, is a staple in Asian cookery.

overtones and lavender-blue leaves, is used sparingly as a tea.

Annual chamomile (*Matricaria recutita*) from Europe and western Asia is naturalized in North America. It grows about two feet tall and is appreciated for its small, daisylike flowers, which make a soothing apple-scented, "good for what ails you" tea. Its lacy foliage and fragrant white blossoms perfume the air on a hot summer day, making it an all-round ornamental, aromatic and culinary herb.

Finally, there is the quintessentially American sunflower (*Helianthus annuus*), which can grow to ten feet. Present in every part of the country but most abundant in the plains, it is the state flower of the Prairie State, Kansas. The beauties shown nodding their golden heads toward the sun in garden catalogs are cultivated varieties of some of the widespread native species. The seeds are used to produce an edible, healthful oil or eaten whole. These we must share with hungry, pecking birds who have a field day with sunflowers — as they do with most herbal weeds of the wild.



ANNUALS FOR SHADE

BY LAUREN SPRINGER

Rehmannia angulata

To say that shady gardens that include annuals often lack of imagination is to put it mildly. Summer after summer, neighborhood after neighborhood, a sea of wax begonias and impatiens is spreading over the continent. Granted, getting beyond this limited plant

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palette takes a bit of effort; the more unusual shade-loving annuals must be grown from seed because there isn't enough demand for them. However, just as the perennial boom of the past decade has resulted in a dizzying number of new and unusual perennials, soon more annuals suited to shade will be available at nurseries and garden centers across the country.

Gardeners can create a lush tropical effect in shady gardens with annuals with unusual foliage and richly hued flowers. A different choice of plants will yield an old-fashioned cottage garden. No matter what

Left: *Coleus x hybridus* makes a colorful background for masses of impatiens.



Impatiens balfourii, above, is taller and more elegant than the commonly grown *Impatiens walleriana*.

kind of garden you choose, keep in mind that a humus-rich, moisture-retentive soil and shelter from wind is what most shade-loving annuals require, for it is in the leaf litter of temperate and tropical forests of the world that most have their origins.

There are some early-flowering, frost-tolerant annuals that can turn a shaded area into a delicate canvas of color. Most of these annuals reseed themselves, often germinating in the fall and overwintering, and all prefer cooler weather. Old favorites like Johnny-jump-ups (*Viola tricolor*) and mauve- or white-flowered biennial honesty (*Lunaria annua*) have been grown and loved for centuries. The variegated form of

honesty is especially effective in the shade; if grown from seed, it won't show the white stipples and streaks until it is quite sizable, causing more than a few gardeners to believe they have been cheated.

Sky blue forget-me-nots (*Myosotis sylvatica*) mingle beautifully with orange and yellow Welsh poppies (*Meconopsis cambrica*) but require a moist situation. West Coast native butter-and-eggs (*Limnanthes douglasii*) can add a froth of pale yellow and cream flowers in late spring and early summer.

Poor-man's orchid (*Schizanthus pinnatus*) from South America blooms in ethereal sprays of pink, lavender and white. It



The delicate pink flowers of *Begonia x semperflorens* contrast nicely with the dark pink leaves.

rivals the intricately patterned flowers of oncidium orchids or the whiskered and spotted faces of some azaleas and alstroemerias. Poor man's orchid isn't as tolerant of cold as the aforementioned annuals, but still performs best in the coolness of a lightly shaded early-summer garden. Its fernlike, fresh green foliage adds to its beauty.

As the summer heats up, annuals of tropical origin come into their own. The foliage of caladiums is so exotic that sparing use is much more effective than massing. The same can be said for *Coleus x hybridus*. The pale chartreuse cultivar 'Pineapple' pairs beautifully with lavender-

blue flowers such as those of *Browallia speciosa* or the tall, graceful *Ageratum houstonianum* 'Cut Wonder', or the curiously spotted *Torenia fournieri* and *Mimulus x hybridus* — but only if there is plenty of green foliage to act as a foil.

Black-eyed Susan (*Thunbergia alata*) has cream, yellow or orange flowers and will climb up dark tree trunks or the supports of a shaded pergola or pavilion. For drier shade, try the golden and variegated forms of hops vine (*Humulus japonicus* 'Aureus' and 'Variegatus') to brighten up a somber vertical spot. They are perennial in mild climates and can be quite rampant.



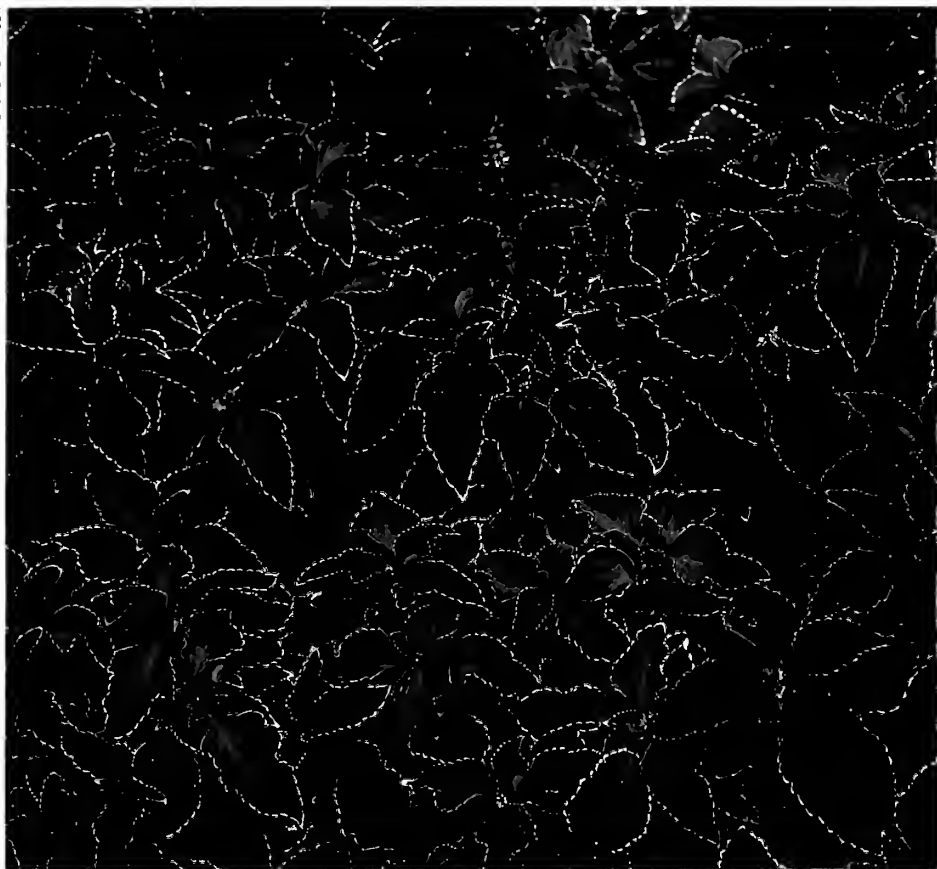
An unusual, double-flowered form of the commonly grown
Impatiens walleriana.

For a low-growing frothy edge to a shaded bed, *Lobelia erinus* is a good subject, in blue, lavender, rose or white. Light shade keeps it in flower much longer than full sun. A favorite of mine, unfortunately much less well known, is blue woodruff (*Asperula orientalis*). It resembles its close relative, perennial sweet woodruff (*Galium odoratum*) in flower and in leaf, yet blooms for a much longer time. The softly fragrant, dainty clusters of pale blue flowers above whorled foliage are a fine addition under large shrubs.

For a more refined, formal look, try an annual groundcover of Madagascar periwinkle (*Catharanthus roseus*). The vinca-

like flowers in shades of rose, pink and white, often with a contrasting darker eye, are borne for several months on a rich carpet of glossy, dark-green leaves. This plant can tolerate a variety of soil and moisture conditions.

I have a weakness for annuals that have the grace and proportions of perennials rather than the stout, overly floriferous selections so popular today. In place of the sweeps of *Impatiens walleriana*, I'd like to see more of the taller, elegant *Impatiens balfourii*, with bicolored flowers of mauve and white which do not overpower the plant and mingle much better with perennials and shrubs in a shady garden. Com-



This form of *Coleus blumei* has golden edges that set off the dark red centers.

bined with a small grouping of polka-dot plant (*Hypoestes phyllostachya*), whose leaves are subtly marked with small pink or white dots, echoing the flower colors of the impatiens, it is as pleasing as any perennial composition.

A similarly soft combination marries the tall, foxglovelike mauve and white flower spires of *Ceratotheca triloba* with fragrant white starbursts of giant woodland tobacco (*Nicotiana sylvestris*). On a smaller scale, rose-flowered, gloxinialike *Rehmannia angulata*, a spreading perennial in areas with mild winters but annual in zones 6 and colder, pairs well with the chartreuse, nodding bells of three-foot

Nicotiana langsdorffii. All the nicotianas, or flowering tobaccos, are wonderful annuals for part shade. The pale green, white and pink forms show up better in the muted light than do the deep red ones. Unfortunately the breeders have dwarfed them and taken away most of their intoxicating perfume, but with the resurging interest in both scented and heirloom plants, the older forms are becoming more available. I hope that this same sentiment will turn shade gardeners away from planting just begonias and impatiens. The flora of this planet is miraculously varied, and there's no reason that our gardens shouldn't reflect this beautiful diversity.



TENDER PERENNIALS

for Annual Excitement

BY JACK POTTER



Salvia 'Purple Majesty'

In established gardens annuals or tender perennials provide splashes of season-long color available from few hardy perennials. (Tender perennials are perennials that aren't hardy in your climate and won't make it through the winter without protection, if at all.) The greatest rewards come from making those splashes of color different from year to year; if you're going to

replant each year, do use the chance for change.

JACK POTTER, a writer and photographer, is curator of the Scott Arboretum in Swarthmore, Pennsylvania. He is the author of *Roses* (Time-Life, 1990).

At the Scott Arboretum in Swarthmore, Pennsylvania, we have been using annual plantings to create that sense of change, striving to surprise our visitors with fresh color schemes and new plants. Many of the less-familiar plants in our recent yearly plantings have been tender perennials, from which we take cuttings to winter on a windowsill or in a greenhouse or cold-frame. Our aim is to have displays that can be replicated fairly easily by home gardeners, so we use these plants in small areas (especially containers) within our larger gardens of hardy, permanent plantings.

Left: *Salvia coccinea*, Texas sage, flowers in light shade or sun.

The results are worth the effort. Among our favorite tender perennials in recent years have been salvias, verbenas and agastaches.

Salvias

Salvia guaranitica, anise-scented sage, was our first sage venture beyond the commonly grown red *S. splendens* and blue *S. farinacea*. It grows to three feet in a season and produces a continual, June-to-frost succession of spikes of deep blue, strongly lipped, tubular flowers over rich green, aromatic foliage. 'Argentina Skies' is a cultivar with silvery blue flowers. It blends softly with neighboring gray or silver foliage, and also flatters bright nearby flowers such as orange kniphofias. *Salvia* 'Purple Majesty' is a *S. guaranitica* hybrid with larger, more

sprawling growth (it may need staking) and with slightly larger, purple flowers from August to frost. *Salvia guaranitica* 'Late Blooming Giant' is taller still (five to six feet), and is sure to need staking. It bears broader, darker, more violet-hued flowers than the species, but not until October, so it is a gambler's plant here: some years frost comes early enough to prevent bloom. This form is very similar to *S. guaranitica* 'Black and Blue' or Costa Rican blue sage. All the salvias above except *S. 'Purple Majesty'* have lived through winters here in Pennsylvania in protected spots, or through mild winters, or under deep mulch. The plants are somewhat tuberous and will send up new shoots from deep underground, so they tolerate a thick winter mulch without danger of suffoca-



JACK POTTER

Salvia rutilans, pineapple sage, has deliciously scented leaves and long spikes of brilliant red, tubular flowers in fall.



Verbena tenuisecta, seen here at the front of the border, has lavender-blue flowers and finely dissected foliage.

tion. They prefer full sun or very light shade. These blue salvias are hummingbird favorites, preferred even over the red-tubed flowers of other sages.

Our most exciting red salvia, both in containers and in a red and purple border, has been *S. vanhouttii*. Garnet-colored calyces appear in July, becoming more abundant and opening with brighter, crimson flowers from August through the first light frosts. Growth is loose and graceful to about four feet, as though the common scarlet bedding sage had been stretched out into a lightly branching plant and its flowers repainted in rich and subtle hues. In full sun *S. vanhouttii* stands alone, but in light shade it needs some support.

Salvia miniata prefers light shade over full sun, grows to three feet and has spikes of scarlet flowers. The flower spikes are always loose enough to reveal the striking contrast with the glossy, handsome, bright green foliage. The plant may be hardy in zones 9 to 10 on the U.S.D.A. hardiness zone map.

Salvia coccinea, Texas sage, grows to

the same height and also has scarlet flowers. It flowers surprisingly well in light shade as well as full sun. Texas sage self-sows freely in our gardens. Seeds germinate after the soil has warmed, and the plants bloom within six weeks; young plants are much bushier if their tips are pinched once or twice. 'Lady in Red' is a compact-growing 1992 All America Selection, available from seed. A white form and a bicolored white and shrimp-pink form are available as plants or seed (and will breed true from seed if the plants are isolated). The white and pink form (*S. coccinea* 'Bicolor') has filled in bare areas of a silver, pink and lavender mixed border at the Arboretum. It flowers from late June or early July to frost, and it is beautiful in the morning; on sunny days, however, most of its flowers become torn by bees forcing their way down the narrow corolla tubes, leaving the plants looking sparse and bedraggled. Ordinary scarlet forms are amply proportioned and escape damage; we haven't grown the white forms.

Salvia greggii forms and hybrids have

broad-lipped flowers in shades of red, white, rose or salmon (and, most recently, yellow). These are drought-tolerant plants from arid regions; they require sharp soil drainage, and bloom poorly while nights are hot and humid. Their best flowering is likely to come after the first fall frosts — if they can be protected from those frosts. I find them a bit frustrating here.

Salvia chamaedryoides, germander sage, has similar requirements and flowers at about the same time, but its gray foliage, pure sky-blue flowers and more restrained, two-foot stature have made it a better container plant for us. Even a few flowers of such extraordinary blue give pleasure.

Salvia rutilans, pineapple sage, and *Salvia elegans*, honey melon sage, resemble each other closely: three and a half-foot

bushy plants with deliciously scented foliage and long spikes of brilliant red tubular flowers. In the fall there is a race to see which comes first, *S. rutilans* blooms or the first frost; the salvia loses in some years. We have just acquired *S. elegans*, which starts flowering in midsummer and carries on until frost.

Salvia leucantha, Mexican bush sage, is another late-season gambler's plant. Plants grow to four and a half feet. The undersides of the leaves and the stems are white and fuzzy, so the overall foliage effect is softly gray-green. Calyces are also fuzzy, and reddish purple, with flowers either in matching purple or white. Plants in bloom look like late, narrow-spiked and elegant buddleias.

Salvia involucrata, rosebud sage, may also wait until October to bloom. We grow a form from Wave Hill, the public garden in the Bronx, and one from Richard Dufresne, the North Carolina salviaphile. The latter begins to flower in July, is bushier and blooms more prolifically through the fall than the former. Its rose-pink flowers appear over broad green leaves with pinkish veins and petioles. Full sun produces the strongest plants and heaviest flowering for *S. rutilans*, *S. leucantha* and *S. involucrata* here at Scott Arboretum.

Verbenas

Most seed-grown bedding verbenas stop blooming during the heat of summer. A number of species and hybrids we have recently grown, however, thrive on our summer heat and humidity, and some bloom heavily through fall as well. These are all low plants of 15 inches or less that creep or run, rooting where leaf nodes on the stems touch the soil (a clue that propagation from cuttings is quick and easy). Individual flowers are flat and small, half an inch or less, but grouped in showy, dome-shaped clusters that continue to elongate



JACK POTTER

The spectacular flower spike of pineapple sage seen close up.



Salvia guaranitica, anise-scented sage, produces continual June-to-frost spikes of deep blue flowers.

and form new buds. They go on flowering well for us even when spent flower clusters are left on the plants.

Verbena 'Sissinghurst' has slightly incised foliage almost hidden by bright pink flowers with enough tones of both salmon and magenta to work well in color schemes headed in either direction. It is our best herbaceous butterfly plant, and such a favorite that we have repeatedly used it, with gray and blue companions, in our most prominent pots. Containers provide the needed good drainage but demand faithful watering and periodic applications of fertilizer.

Verbena canadensis has forms and hybrids in mauve, pink, purple, white and red. The heaviest blooming for us, over the longest season, has been a red-violet form from Montrose Nursery with no cultivar name. We have massed it in a border of deep pink 'Carefree Beauty' roses, and both plants have flowered from June until well after frost. It was a mainstay in our red and purple border, and also a great companion to the gray-white, long-blooming

hardy perennial *Calamintha nepeta*, joined in September by mauve-pink colchicums. In our highest voltage containers this verbenas was paired with the vivid orange annual *Zinnia linearis*. For us, some *V. canadensis* plants survive some winters. (Through the mild 1990-1991 winter all the plants in raised beds in my home roof-deck garden remained nearly evergreen and began to bloom again in April.) A clear red *V. canadensis* hybrid (also from Montrose Nursery) and the pale pink *V.* 'Appleblossom' have been superb container plants at Scott; this year the red, as true and clear a primary color as I have ever seen in a flower, takes its first turn in open ground.

Verbena peruviana, with scarlet flowers, and *Verbena tenera* var. *maonettii*, with magenta flowers edged white, are both creeping plants that grow four or five inches high but spread at least a couple of feet in a season. These tight mats can make a snug home for spider mites; *V. peruviana* was a little disappointing in our red and purple border.

Verbena tenuisecta is medium in height,

to about twelve inches, with thin stems and finely dissected foliage. Flowers in the typical form are lavender-blue, white in the cultivar 'Alba'. These may self-sow here, and are hardy in zones 8-10. Lavender-blue *V. tenuisecta*, with its soft color and lacy foliage, was an even prettier companion than the red-violet *V. canadensis* for deep pink roses, but bloomed most profusely in early summer and declined sharply after August. Two new hybrids from Edith Eddleman's borders at North Carolina State University Arboretum maintain the delicate foliage texture, add new flower colors and have been among the most abundant, longest, latest-blooming plants in our gardens. *Verbena* 'Edith', with soft mauve flowers and slightly more compact habit, bloomed past hard frosts and almost up to

Christmas last year. *Verbena* 'Flamingo Border Pink' is taller than 'Edith', bears bright magenta-pink flowers and is about as floriferous.

All these verbenas perform best with well-drained soil and full sun; the *Verbena tenuisecta* group is more tolerant than the others of very light shade.

Agastaches

Agastaches, or hyssops, are related to salvias and have spikes of small, tubular flowers. *Agastache* 'Firebird' may grow to four feet where it is hardy; plants in their first season from cuttings will reach about half that height, perhaps distracted from growth by their continually increasing bloom from June to late fall. Flowers are narrow tubes about an inch long, opening



JACK POTTER

Salvia 'Purple Majesty' is a large, sprawling plant that may need to be staked.



The tubular flowers of *Agastache* 'Firebird' open orange and turn magenta, for a smoky, burnt-orange effect.

orange and becoming magenta, borne in loose but abundant spikes. The overall effect is a subtle, smoky burnt-orange, very beautiful beside the purple foliage of 'Crimson Pygmy' barberries, and the chief inspiration for a planned burnt-orange and amber border. *A. 'Firebird'* to me resembles a penstemon; it has the air of a plant for full sun, but one end of our barberry bed is shaded much of the day in autumn and the plants there performed almost as well as the others.

We acquired *A. 'Firebird'* from Stonecrop, in New York's cold Hudson Valley, with a strong recommendation but no expectation that it would be winter hardy. We have since heard that it has consistently overwintered in Massachusetts. Richard Dufresne, who hybridized this and a number of other agastaches, rates it as hardy in zone 6. This past winter has been too mild to pose a real test, but our plants so far look fine.

We are growing cuttings of other agastaches, some perhaps hardy here, others almost certainly not. 'Apricot Sunrise' will join our amber and orange scheme; 'Pink Panther' and 'Pink Lemonade' will support

softer colors.

Adding a few tender perennials to a garden doesn't require a large greenhouse or a Victorian estate staff. Plants of borderline hardiness will winter securely in a cold-frame. Many tender plants grow large in a single season, so small numbers of plants have disproportionate impact. Some of the salvias (especially *S. leucantha* and *S. involucrata*) quickly become shrubby plants with strong presence. The vigorous, carpeting verbenas cover large areas or weave into their neighbors. Softwood cuttings taken early in fall, before cold weather, usually root easily (for agastache cuttings, use basal, non-flowering shoots). Even a few plants overwintered on a windowsill — or purchased in late spring — can make a big difference in a garden.

SOURCES

CANYON CREEK NURSERY

3527 Dry Creek Rd.
Oroville, CA 95965
(916) 533-2166

GLASSHOUSE WORKS GREENHOUSE

Church Street, P.O. Box 97
Stewart, OH 45778-0097
(614) 662-2142

LOGEE'S GREENHOUSES

141 North Street
Danielson, CT 06239
(203) 774-8038

MONTROSE NURSERY

P.O. Box 957
Hillsborough, NC 27278
(919) 732-7778

THE SANDY MUSH HERB NURSERY

Route 2, Surret Cove Road
Leicester, NC 28748
(704) 683-2014



ANNUALS FOR THE CONTAINER GARDEN

BY TOM PEACE



Gloriosa rothschildiana

There is nothing quite as elegant as an outdoor summer retreat adorned with pots overflowing with exquisite foliage and colorful flowers. A rustic whiskey barrel filled with jewel-toned dahlias, cannas and zinnias set among burundy-leafed castor bean and purple fountain grass warms up a sunny deck, while a classic urn displaying coleus, tuberous begonias and delicate curtains of trailing

lobelia highlights the shaded terrace.

Container plantings add style and life to any outdoor living space. The key to success is finding the right plants to satisfy both the cultural and aesthetic requirements dictated by each site. Some plants need to remain cool in order to perform throughout the summer months, while some like it hot. It is important to investigate the prospective growing space before spending your time and money on the wrong plants.

TOM PEACE, a garden designer, writer and nurseryman, makes use of a wide variety of plants to create gardens in Arizona, Colorado and Texas.

One particularly lovely combination for a cool north-facing patio (with the pots kept right up against the shady building away

Left: Containers of nasturtiums, petunias, lobelia and alyssum cascade down the stairs.

from hot sun) includes the old-fashioned standard fuchsia (*Fuchsia x hybrida*) with red sepals and violet corolla, and the red tuberous begonia (*Begonia x hybrida*), in a mass of white or hot-pink impatiens and purple swan river daisy (*Brachycome iberidifolia*), accented with a solitary polka dot plant (*Hypoestes phyllostachya*). This combination can be assembled in one container or an assortment of smaller, different-sized pots, each highlighting a particular component of the grouping. In a spot that absolutely bakes in the summer sun, try the purple princess flower (*Tibouchina urvilleana*) with lemon-yellow lantana (*Lantana camara*) and brilliant ruby-red verbena (*Verbena x hybrida*) cascading

over the edge of a dark slate planter.

Instead of a combination of plants, you may want to mass one species or cultivar. Moss rose (*Portulaca* species), periwinkle (*Catharanthus roseus*), *Gazania rigens* and verbena can easily hold their own in the face of heat and drought. Begonias, impatiens or violas can brighten up dark balconies and patios with beautiful blossoms.

I would not want to lead you to believe that only blooming plants can grace container gardens; foliage is as overlooked in pots as it is in the ground. When I design plantings, I usually consider the flowers secondary to the leaf forms of the plants I combine. There are three types of foliage: bold, linear and fine-textured. Just as they do in



Here, sunny marigolds and dahlias are massed in clay pots. The tiny purple trailing flower is lobelia.



Helichrysum petiolare and
Tradescantia pallida, an unusual and
elegant combination.

the garden, foliage plants define and anchor container plantings. For the shady corner, imagine an old kettle brimming with white *Caladium x hortulanum*, variegated spider plant (*Chlorophytum comosum* 'Variegatum') and *Asparagus densiflorus* 'Sprenger'. This *menage a trois* is a knockout in virtually every climate of the U.S.

A large terra cotta pot with red-leaved castor bean (*Ricinus communis*), dusty miller and purple heart (*Tradescantia pallida*) can easily dominate a patio in the hot sun or anchor additional containers featuring orange and yellow flowers.

Container gardens have much in common with cut-flower arrangements inasmuch as they present a distinctly framed assortment of colors and textures. Adventurous designers create lovely mixed "bouquets" by unabashedly mixing temperate and tropicals, elegant flowers and weeds.

When shopping for plants don't limit yourself to the overused annuals offered by local garden centers. Explore their hothous-

es and outdoor perennial collections for new and different textures, colors and architectural forms. Try using species and forms of *Eucalyptus*, *Agave*, variegated *Ficus* or *Dracaena marginata* 'Tricolor' to embellish displays in the sun, and *Sansevieria*, *Pothos*, rex begonias or a myriad of tropical ferns in shady arrangements. Blue fescue (*Festuca ovina* 'Glaucá'), Japanese blood grass (*Imperata cylindrica* 'Rubra'), pink fountain grass (*Pennisetum alopecuroides*) or garden-er's garters (*Phalaris arundinacea*) are among the grasses whose linear foliage can be a welcome addition to your pots.

Hostas in shades of emerald, blue and gold, *Bergenia cordifolia* and *Ligularia dentata* are three good examples of hardy perennials that add bold foliage to combinations in shaded settings. For sunnier positions, try silver clary (*Salvia argentea*) and silver mullein (*Verbascum bombyciferum*), both stunning with *Heuchera* 'Palace Purple' or, for a unique touch, garden rhubarb.

Don't ignore summer bulbs for accent in container combinations. My favorites include summer callas, especially yellow *Zantedeschia elliottiana* and white *Z. albo-maculata*. Both feature distinctly spotted, arrow-head-shaped foliage and add a wonderful touch to the shaded corner. Another choice bulb is *Achimenes*, which gives a nonstop performance of pink, white or purple blooms when kept warm enough. Gloriosa lily (*G. rothschildiana*) can be added to a large grouping (for it does grow tall and needs other plants for support) and makes a sensational accent with bronze-leaf canna 'Cheyenne', blue mealy sage (*Salvia farinacea*), yellow hibiscus (*H. rosa-sinensis*), nasturtiums and purple basil (*Ocimum basilicum* 'Purple Ruffles'). Like *Achimenes*, the South African chinchierinchee (*Ornithogalum thyrsoides*) can be grown on its own and makes a wonderful centerpiece for the summer table. Indeed, the bulbs can be tucked into almost any container arrange-

ment as their white flowers and simple foliage harmonize with just about everything.

Some annuals and tender perennials absolutely must be tried despite the fact that searching for them is a little like the quest for the Holy Grail. Most are easy to grow, notwithstanding their rarity, and can be used in a wide variety of sites. Woodland tobacco (*Nicotiana sylvestris*) is a garden giant that stays smaller in containers but retains its bold stature and striking interest. Its large, vibrant leaves are whorled up the pyramidal plant, terminating in an explosion of pendant, white tubular flowers that are deliciously fragrant on summer evenings. Woodland tobacco makes an excellent focus for a pastel collection, or an

all-white garden in a white terra cotta pot. I like it best towering above plants that contrast with its spring-green foliage, such as Chinese basil (*Perilla frutescens*), dark red coleus and burgundy fountain grass, enlivened further by jewel-tone nasturtiums and marigold 'Lemon Gem'.

Another great performer is *Fuchsia* 'Gartenmeister'. It is versatile as a soloist. I use mine, a six-year-old shrub in a five-gallon pot, to temporarily fill blank spots in the garden as well as accent collections of other potted flowers. 'Gartenmeister' can play a part in a trio or quintet, with its clusters of coral-orange trumpet flowers dancing above *Nicotiana alata* 'Nicki Lime' and blue trailing lobelia (*L. erinus*), perhaps with yel-



Old stumps showcase dahlias, ivy geranium, pansies and lobelia.



Dusty miller sets off pink ivy geraniums and impatiens. Chrysanthemums bloom in the bed.

low coleus and Japanese blood grass.

Somewhat harder to find but worth the effort (even if you have to order it by mail) is *Helichrysum petiolare* 'Limelight'. The plant is a bit particular about its needs (full sun and good drainage) but the chartreuse foliage glows. Fortunately, 'Limelight' looks splendid on its own in a pot or with ivy geraniums (*Pelargonium peltatum*), which can live with its restrictive cultural requirements. The species *H. petiolare*, I might add, has the same full form but is a cool silvery color, making it a substitute for dusty miller.

New to me last year but already one of my favorites is fan flower (*Scaevola aemula* 'Blue Wonder') whose sprawling stems are terminated by endlessly blooming fans of blue flowers resembling those of lobelia. The plant combines well with yellow coleus, pink flowering tobacco or 'Gartenmeister'.

Two other candidates for adding a touch of blue to container gardens are *Ageratum* 'Cut Wonder' and tall verbena (*Verbena bonariensis*). Both plants are

somewhat leggy and therefore a bit awkward on their own but look just fine in a crowd. 'Cut Wonder' mixes well with most everything and doesn't get as much dead flower accumulation as many of the other *ageratum*s. It is smashing in sun or partial shade with rose-pink geraniums and yellow *Chrysanthemum multicaule*. Tall verbena is quite a bit taller and needs to be grown in a big pot for best results, combined with other heat lovers such as orange Mexican fire bush (*Hamelia patens*) or scarlet *Salvia coccinea* and yellow gloriosa daisy (*Rudbeckia hirta*) to balance the spectrum.

Just about any plant that combines well in a mixed border will do well in a container, provided that it is large enough (the larger plants will need a pot 15 inches minimum in diameter). Annuals like castor bean, spider flower (*Cleome hassleriana*), Mexican sunflower (*Tithonia rotundifolia*), woodland tobacco, canna and dahlias all require spacious accommodations. So do nasturtiums and California poppies, even though they do not attain the same giant proportions. Large pots lend themselves to more diverse plantings and do not need to be watered as frequently during hot, dry weather. Unless you are inclined to spend your summer with the hose or watering can in hand, do not plant in any pot smaller than eight inches in diameter.

The one drawback to very large planters is that it may take your entire garden budget just to fill them with soil, at which point you will never be able to move them again. There is a simple solution. As only about 15 to 18 inches of soil is needed for rooting, fill the bottom of a deep planter with anything organic or inorganic that is lightweight and inexpensive — bark mulch, pine cones or styrofoam packing peanuts — and then place the soil mix on top. This allows you to spend your money on what counts — the plants. Furthermore, you won't need an army to help move your

containers should the desire to redecorate strike you in midseason.

The best choice for containers is still the classic terra cotta pot, available in a myriad of sizes and shapes and even buff and white. Naturally porous, the clay pot allows the soil to breathe and cool the root zone via evaporation. While this is a boon for plants that need good drainage, it makes retaining moisture for water-loving plants more difficult. An easy remedy is to

paint the inside of smaller pots and those for moist soils with the black tar paint sold for coating cut tree limbs. It is sold as an easy-to-apply spray; be careful to stay two or three inches below the rim to hide the black lining below soil level.

Of course, many other types of containers are available, from wood, metal and plastic to antique household objects. Anything goes — both in your choice of containers and your selection of annuals.



LAUREN SPRINGER

Salvia farinacea with its tall bluish spikes, pink *Verbena rigida* and trailing *Vinca* grace this decorative urn.

ANNUALS

FOR SPECIAL PURPOSES

FOR FRAGRANCE



Gaillardia



Pelargonium

ROB PRACTOR

ROB PRACTOR

<i>Abronia</i> spp.	Sand verbenas
<i>Agastache</i> spp.	Agastaches
<i>Agcratum houstonianum</i>	Ageratum
<i>Anethum graveolens</i>	Dill
<i>Angelica archangelica</i>	Angelica
<i>Asperula orientalis</i>	Blue woodruff
<i>Calendula officinalis</i>	Pot marigold
<i>Centaurea moschata</i> 'Imperialis'	Sweet sultan
<i>Chciranthus chciri</i>	Wallflower
<i>Coriandrum sativum</i>	Coriander
<i>Datura inoxia</i>	Angel's trumpet
<i>Dianthus barbatus</i>	Sweet William
<i>D. chinensis</i>	Pink
<i>Erysimum hieraciifolium</i>	Siberian wallflower
<i>Eschscholzia californica</i>	California poppy
<i>Focniculum vulgare</i>	Fennel
<i>Hedysarum coronarium</i>	French honeysuckle
<i>Heliotropium arborescens</i>	Cherry pie
<i>Hesperis matronalis</i>	Sweet rocket
<i>Ibcris</i> spp.	Candytufts
<i>Ipomoca alba</i>	Moon vine

continued on the next page



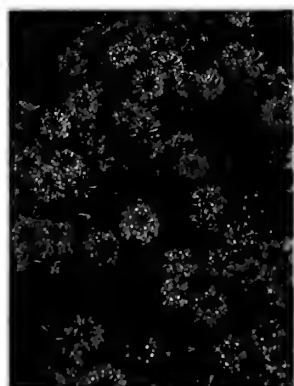
RITA BUCHANAN

Night-scented stock



LAUREN SPRINGER

Pelargonium graveolens



LAUREN SPRINGER

Purple verbena

continued from the prior page

<i>Ipomopsis aggregata</i>	Skyrocket
<i>Lantana camara</i>	Lantana
<i>Lathyrus odoratus</i>	Sweet pea
<i>Lobularia maritima</i>	Sweet alyssum
<i>Lunaria annua</i>	Honesty
<i>Malcolmia maritima</i>	Virginia stock
<i>Matricaria recutita</i>	German chamomile
<i>Matthiola longipetala</i>	
ssp. <i>bicornis</i>	Stock
<i>M. incana</i>	Evening stock
<i>Mentzelia lindleyi</i>	Blazing star
<i>Mirabilis jalapa</i>	Four-o'clock
<i>Monarda citriodora</i>	Lemon balm
<i>Myosotis sylvatica</i>	Forget-me-not
<i>Nemophila menziesii</i>	Baby blue eyes
<i>Nicotiana</i> spp.	Flowering tobaccos
<i>Ocimum basilicum</i>	Basil
<i>Oenothera</i> spp.	Evening primroses
<i>Pelargonium</i> spp.	Geraniums
<i>Petroselinum crispum</i>	Parsley
<i>Petunia x hybrida</i>	Petunia
<i>Phlox drummondii</i>	Annual phlox
<i>Reseda odorata</i>	Mignonette
<i>Salvia</i> spp.	Sages
<i>Tagetes</i> spp.	Marigolds
<i>Tanacetum parthenium</i>	Feverfew
<i>Trachymene coerulea</i>	Blue lace flower
<i>Tropaeolum majus</i>	Nasturtium
<i>Verbena x hybrida</i>	Verbena

FOR CLIMBING OR TRAILING



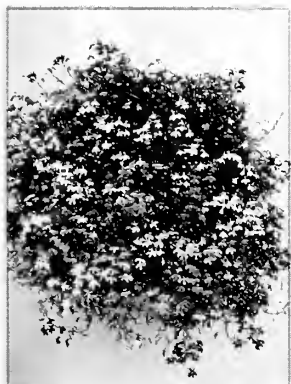
LAUREN SPRINGER

Cup and saucer vine



LAUREN SPRINGER

Morning glories



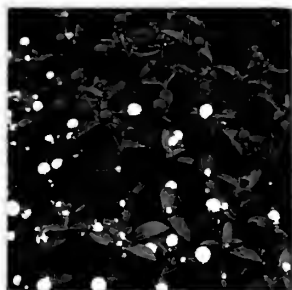
LAUREN SPRINGER

Lobelia erinus

t = trailing c = climbing

<i>Begonia</i> spp.	t	Begonias, some types
<i>Browallia speciosa</i>	t	Browallia
<i>Catharanthus roseus</i>	t	Madagascar periwinkle
<i>Clitoria</i> spp.	c	Butterfly peas
<i>Cobaea scandens</i>	c	Cup and saucer vine
<i>Cucurbita</i> spp.	c,t	Gourd vines
<i>Dolichos lablab</i>	c	Hyacinth bean
<i>Eccremocarpus</i> sp.	c	Sunset creeper
<i>Fuchsia</i> spp.	t	Fuchsias
<i>Humulus japonicus</i>	c,t	Hop vine
<i>Ipomoea purpurea</i>	c,t	Morning glory
<i>Ipomoea quamoclit</i>	c	Cypress vine
<i>Lantana</i> spp.	t	Lantanas
<i>Lathyrus odoratus</i>	c	Sweet pea
<i>Lobelia erinus</i>	t	Lobelia
<i>Merremia</i> spp.	c	Wood roses
<i>Pelargonium peltatum</i>	c	Ivy geranium
<i>Petunia x hybrida</i>	t	Petunias, some types
<i>Phaseolus coccineus</i>	c	Scarlet runner bean
<i>Plumbago</i> spp.	c,t	Plumbagos
<i>Portulaca</i> spp.	t	Portulacas, some types
<i>Rhodochiton atrosanguineum</i>	t	Purple bell vine
<i>Sanvitalia procumbens</i>	t	Creeping zinnia
<i>Thunbergia alata</i>	c,t	Black-eyed Susan vine
<i>Tropaeolum majus</i>	c,t	Nasturtiums, some types
<i>T. peregrinum</i>	c	Canary creeper
<i>Verbena</i> spp.	t	Verbenas, some types
<i>Vinca major, V. minor</i>	t	Vincas
<i>Zinnia angustifolia</i>	t	Narrow-leaved zinnia

FOR DRYING



LAUREN SPRINGER

Globe amaranth

Celosia cristata Cock's comb, plume flower

Gomphrena globosa Globe amaranth

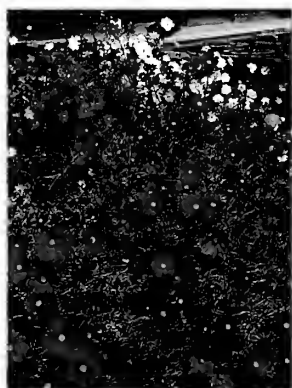
Helichrysum bracteatum Strawflower

Limonium sinuatum Statice

Physalis alkekengi Chinese lantern

Xeranthemum annuum Immortelle

FOR BIRDS & BUTTERFLIES



LAUREN SPRINGER

Cosmos bipinnatus

b = butterflies

s = songbirds (they eat the seeds so don't deadhead)

h = hummingbirds (attracted to red, tubular flowers)

m = moths

Ageratum houstonianum **b** Floss flower

Antirrhinum majus **h** Snapdragon

Callistephus chinensis **b,s** China aster

Coreopsis tinctoria **b,s** Tickseed

Cosmos bipinnatus **b,s** Cosmos

Dianthus spp. **b** Pinks

Echium lycopsis **b** Viper's bugloss

Fuchsia x hybrida **h** Fuchsia

Gaillardia pulchella **b** Annual Indian blanket

Helianthus annuus **b,s** Sunflower

Heliotropium arborescens **b** Cherry pie



LAUREN SPRINGER

Helianthus annuus



LAUREN SPRINGER

Statice



ELLEN MITCHELL

Tropaeolum majus



RITA BUCHANAN

Zinnia elegans

Impatiens walleriana **b,s** Busy Lizzie

Ipomoea alba **b,m** Moon vine

I. purpurea **b** Morning glory

Lantana spp. **b** Lantanas

Limonium sinuatum **b** Statice

Lobelia erinus **b** Lobelia

Lobularia maritima **b** Sweet alyssum

Mirabilis jalapa **b,m** Four o'clock

Myosotis sylvatica **s** Forget-me-not

Nicotiana glauca **b,h** Jasmine tobacco (moths)

Pelargonium spp. **h** Geraniums

Petunia x hybrida **h** Petunias

Phlox drummondii **b,h** Drummond's phlox

Portulaca grandiflora **s** Moss rose

Reseda odorata **b** Mignonette

Salvia splendens **h** Scarlet sage

Scabiosa atropurpurea **b** Pincushion flower

Tagetes spp. **b,s** Marigolds

Tithonia rotundifolia **b,s** Mexican sunflower

Tropaeolum majus **b,h** Nasturtium

Verbena bonariensis **b** Tall verbena

Zinnia elegans **b,s** Zinnia

ANNUALS THAT NEED LITTLE WATER



ROB PROCTOR

Cleome hassleriana



ELLEN MEYERS

California poppy



CHRISTINE M. DOUGLAS

Petunia

<i>Argemone platyceras</i>	Prickly poppy
<i>Brachycome iberidifolia</i>	Swan River daisy
<i>Centaurea cyanus</i>	Bachelor button
<i>Cleome hassleriana</i>	Spider flower
<i>Coreopsis tinctoria</i>	Tickseed
<i>Cosmos bipinnatus</i>	Cosmos
<i>Cuphea ignea</i>	Firecracker plant
<i>Dianthus</i> spp.	Pinks
<i>Dimorphotheca</i> sp.	Cape marigold
<i>Daucus carota</i>	Queen Anne's lace (biennial)
<i>Diascia</i> spp.	Twinspurs
<i>Dorotheanthus</i>	Livingstone daisy
<i>Dyssodia tenuiloba</i>	Dahlberg daisy
<i>Emilia javanica</i>	Tassel flower
<i>Eschscholzia californica</i>	California poppy
<i>Euphorbia marginata</i>	Snow-on-the-mountain
<i>Gaillardia pulchella</i>	Annual Indian blanket
<i>Gazania rigens</i>	Treasure flower
<i>Gomphrena globosa</i>	Globe amaranth
<i>Gypsophila elegans</i>	Sunflower
<i>Helipterum</i> spp.	Strawflowers
<i>Hunnemannia fumarifolia</i>	Mexican poppy

ANNUALS THAT NEED LITTLE WATER



ROB PROCTOR

Dusty miller



JACK POTTER

Verbena tenuisecta



LAUREN SPRINGER

Xeranthemum annuum

<i>Ipomoea purpurea</i>	Morning glory
<i>Lavatera trimestris</i>	Rose mallow
<i>Kochia scoparia</i>	Burning bush
<i>Limonium sinuatum</i>	Statice
<i>Linum grandiflorum</i>	Scarlet flax
<i>Linaria</i> spp.	Baby snaps
<i>Mentzelia lindleyi</i>	Blazing star
<i>Mesembryanthemum</i> spp.	Ice plants
<i>Mirabilis jalapa</i>	Four o'clock,
<i>Nolana</i> spp.	Chilean bellflowers
<i>Oenothera biennis</i>	Evening primrose
<i>Papaver somniferum</i>	Opium poppy
<i>Perilla frutescens</i>	Perilla
<i>Portulaca grandiflora</i>	Moss rose
<i>Rudbeckia hirta</i>	Black-eyed Susan
<i>Senecio cineraria</i>	Dusty miller
<i>Silene armeria</i>	Pink catchfly
<i>Tropaeolum majus</i>	Nasturtium
<i>Venidium</i> spp.	Cape daisies
<i>Verbascum</i> spp.	Mullein (biennial)
<i>Verbena</i> spp.	Verbenas
<i>Xeranthemum annuum</i>	Immortelle

HARDINESS ZONE

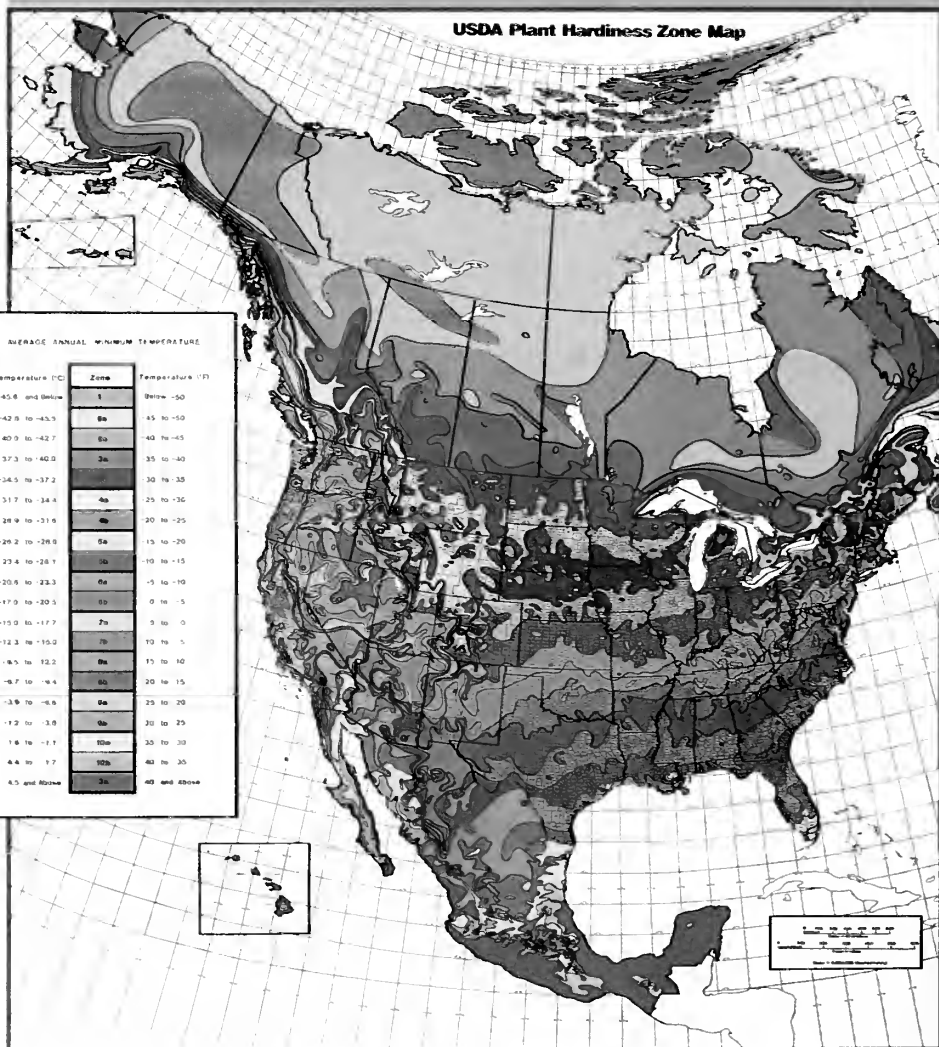
MAP

USDA Plant Hardiness Zone Map

AGRICULTURAL RESEARCH SERVICE USDA

AVERAGE ANNUAL MINIMUM TEMPERATURE

Temperature (°C)	Zone	Temperature (°F)
-45.6 and below	1	Below -50
-42.8 to -43.3	2a	45 to -50
-40.9 to -42.7	2b	40 to -45
-37.3 to -40.0	3a	35 to -40
-34.5 to -37.2	3b	30 to -35
-31.7 to -34.4	4a	25 to -30
-28.9 to -31.6	4b	20 to -25
-26.2 to -28.8	5a	15 to -20
-23.4 to -26.1	5b	10 to -15
-20.6 to -23.3	6a	-5 to -10
-17.9 to -20.5	6b	0 to -5
-15.0 to -17.7	7a	5 to 0
-12.3 to -15.0	7b	10 to 5
-9.5 to -12.2	8a	15 to 10
-6.7 to -9.4	8b	20 to 15
-3.9 to -6.6	9a	25 to 20
-1.2 to -3.9	9b	30 to 25
1.6 to -1.1	10a	35 to 30
4.4 to 1.7	10b	40 to 35
6.5 and above	11a	45 and above



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